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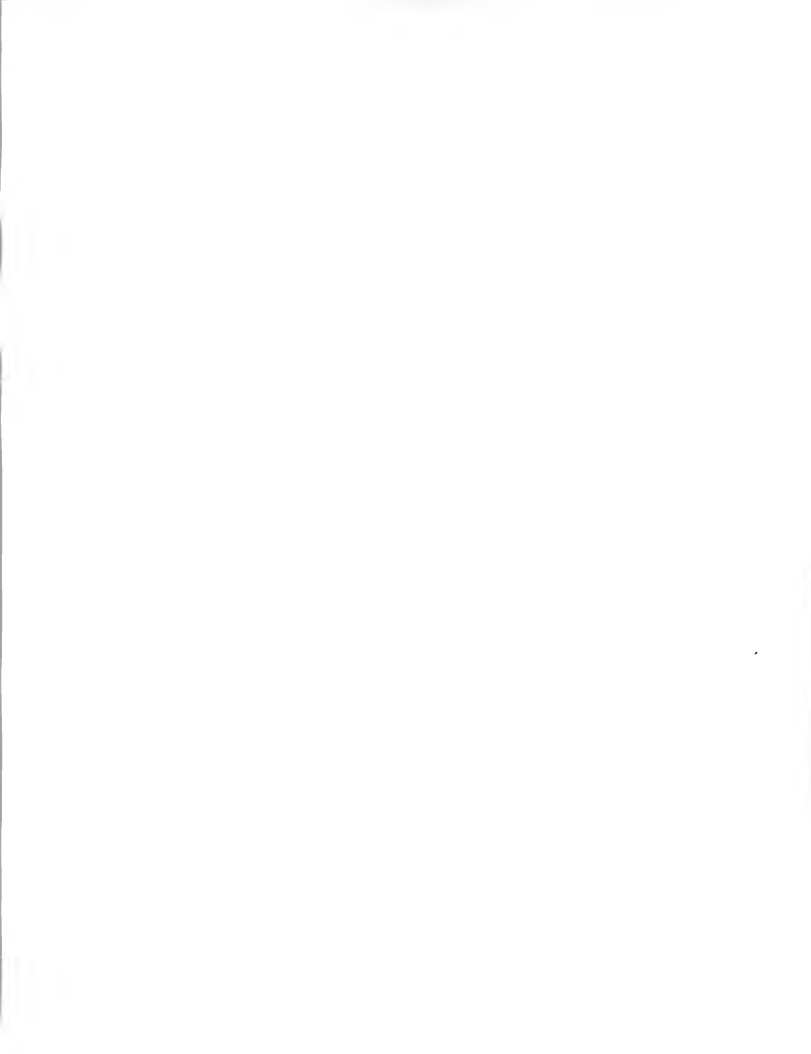
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DECEMBER 1989

SERVICE VENDOR ANALYSIS

LARGE SYSTEMS

Published by
INPUT
1280 Villa Street
Mountain View, CA 94041-1194
U.S.A.

Customer Service Program

***Service Vendor Analysis—
Large Systems***

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Abstract

This report, *Service Vendor Analysis—Large Systems*, is the second report in the large-systems module of INPUT's Customer Service Program. The first report, *Large-Systems Service Analysis*, measured user requirements for and satisfaction with service and support as provided by leading vendors of large systems. The last report in the series, *Service Market Analysis*, will provide a current market size and five-year forecast for large systems, midrange systems, third-party maintenance, PC/workstations and ancillary services, and summarize the year's research findings.

The report contains profiles of the service organizations of seven leading large-systems vendors: Amdahl, CDC, Bull HN Information Systems, IBM, Hitachi Data Systems, NCR, and Unisys. Each profile begins with a short discussion of the company and important service news items from the past year. Next, each profile presents data about the service organization, including revenue totals, employee counts, and office locations, when available. Each profile concludes with a discussion of service delivery, including contract coverage and services provided.

Following these profiles, the report provides summary tables of key service information about the profiled service organizations. These tables will allow quick comparisons between companies analyzed in this study.

The report contains 62 pages, including 18 exhibits.

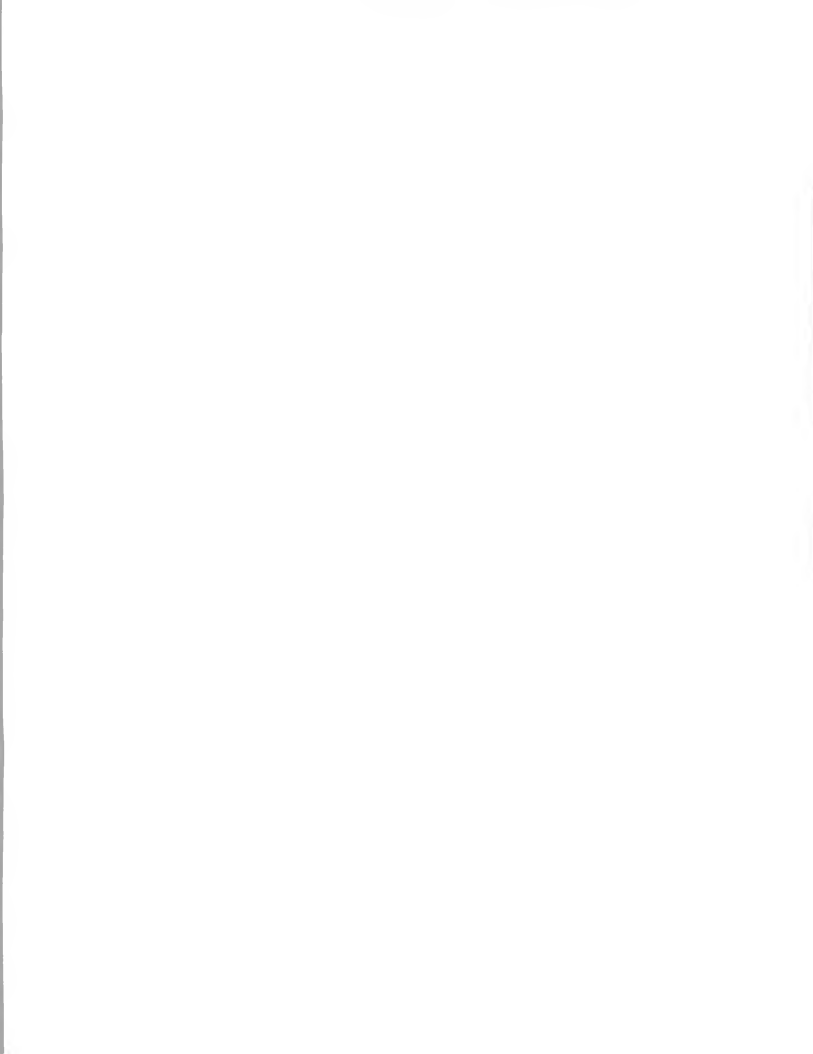
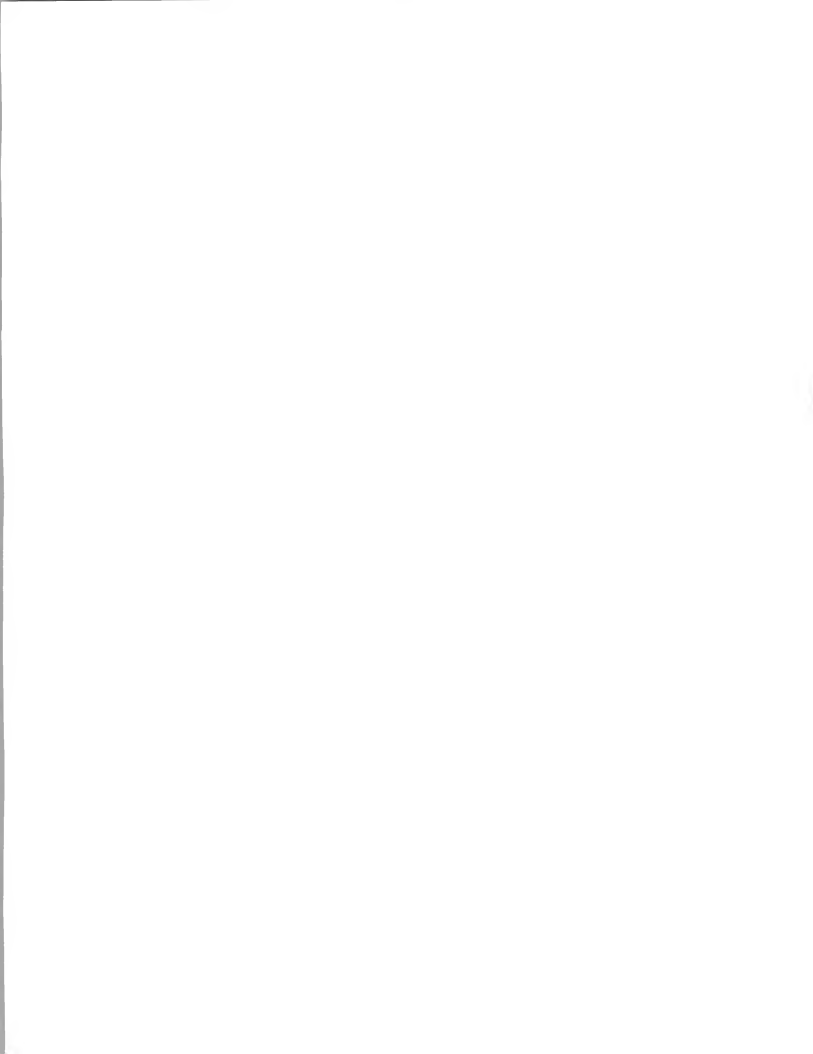


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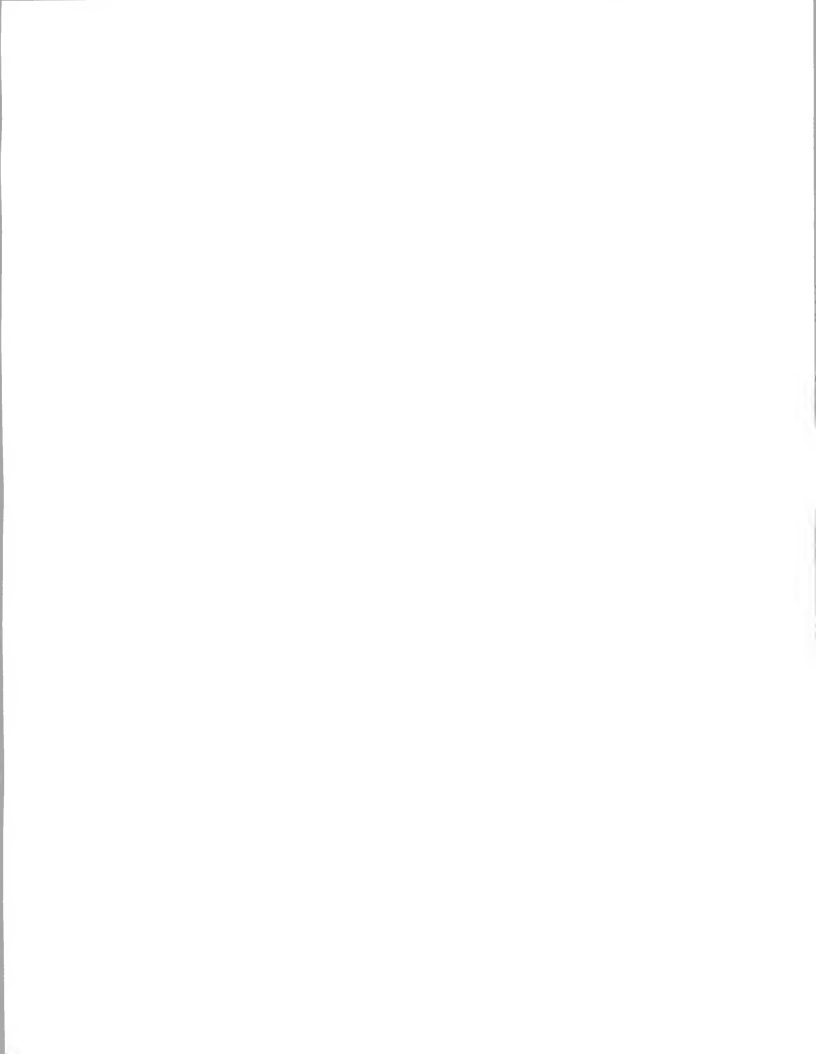
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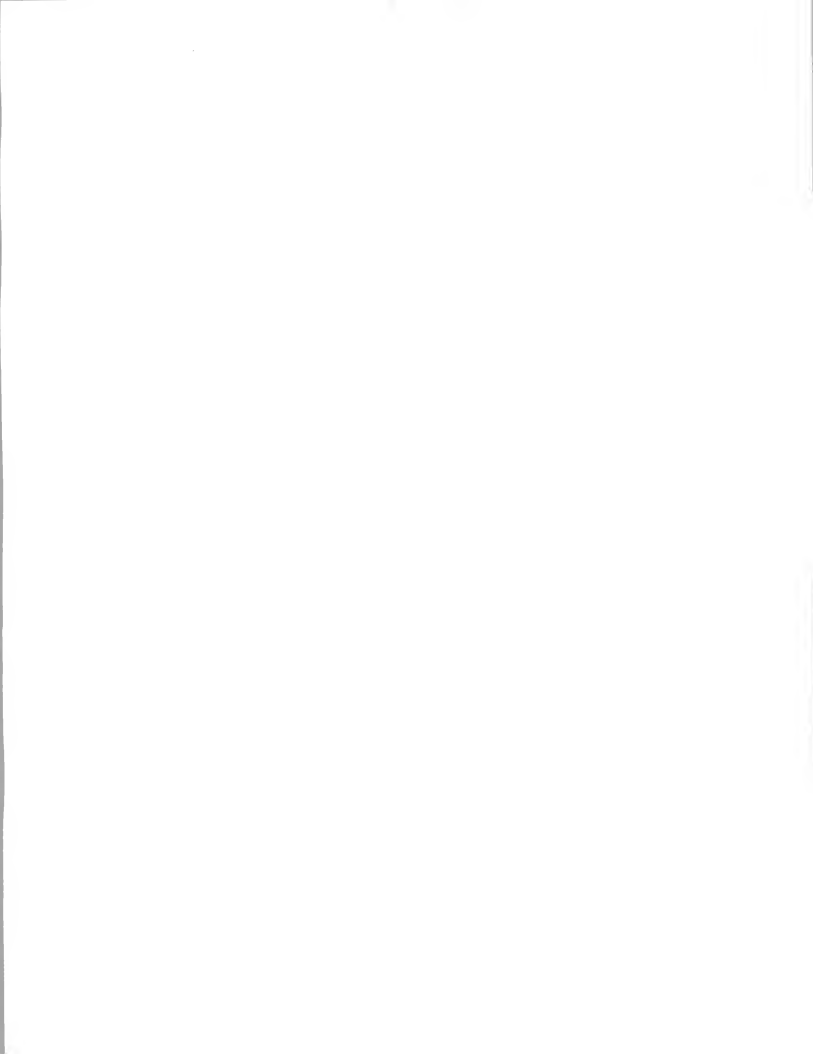
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Introduction







Introduction

A

Scope

This report contains profiles of the service organizations of seven leading large systems vendors: Amdahl, Control Data Corporation, Bull HN Information Systems (formerly Honeywell Bull), IBM, Hitachi Data Systems (formerly NAS), NCR Corporation and Unisys. Each profile begins with a short discussion of the company and important service news items from the year just past. Next, each profile presents data about the service organization, including revenue totals, employee counts, and service locations where available. Each profile includes a discussion of important service delivery processes, including contract coverage and services provided, as well as commentary on the strategic direction the service organization seems to be taking.

Following these profiles, the report provides summary tables of key service information about the profiled service organization. These tables will permit quick comparisons between companies analyzed in this study, as well as provide data on the last several years' trends.

Appendixes at the end of this study contain an example of the survey questionnaire used for this study, as well as a list of definitions used in this report.



B**Methodology**

INPUT attempted to survey the companies profiled in this study using the questionnaire shown in Appendix A. In most cases, the companies willingly shared information about their operations and programs; in a few cases, however, selected data was considered to be confidential, so INPUT supplemented the information gathered during the survey with data contained in our Information Center, located in our Mountain View, CA headquarters office. Annual reports, 10Ks, press releases, marketing brochures, press clippings and independent observations have all been used as supplementary information.

Analytical comments are the result of INPUT analysis and do not necessarily represent the views of the companies studied in this publication. Worldwide service revenues indicated in this report include a wide range of offerings, and may not be directly compared between companies in most instances. When U.S. service revenues are mentioned in the body of a specific company profile, we have attempted to apply a narrower, more conventional definition to permit more direct comparability.



Service Vendor Profiles



COMPANY PROFILE

AMDAHL CORPORATION

1250 East Arques Avenues
Sunnyvale, CA 94089
(408) 746-6000

John C. Lewis, Chairman and CEO
Joseph J. Francesconi, Senior Vice
President, Customer Services
Total Employees: 6,000
Total 1988 Revenue: \$1,801 million
Total 1988 Service Revenue: \$334 million*

* Includes leasing and other revenue. Total worldwide hardware maintenance and ancillary services was \$221 million and the U.S. portion of that was \$133 million.

The Company

Amdahl Corporation, founded in 1970, is a major supplier of large-scale general-purpose computer systems and related peripherals. In 1988, Amdahl was ranked approximately 25th in size (using annual revenues as a gauge) of all information technology suppliers, worldwide.

Amdahl's major competitors are IBM, with an estimated 87% share of the mainframe market, and National Advanced Systems (formerly NAS, now Hitachi Data Systems), which held a 2% share. In mid-1988 Amdahl held an 11% market share, based on units sold. Amdahl was expected to ship 350 to 360 mainframes during 1989, of which half were expected to be the 5990 series, aimed at airlines, banks, and large brokerage houses with high performance needs. This prompted additional important service revenue growth.

In January 1989, Amdahl purchased Key Computer Laboratories, Inc. for 1.5 million shares of Amdahl stock, or about \$29 million. Key is a research firm which is expected to play a significant role in adapting its UNIX offering to Amdahl's; while Key's version of UNIX is not expected to be released until late 1990, performance may leapfrog IBM's UNIX offering which came out in 1989.

Amdahl's 1988 revenues grew by 19.7% from the prior year. Net income from operations grew by almost 30%, and per-share income after tax grew from \$1.41 to \$2.08, a 47.5% increase. However, 1989 did not produce the same highly attractive growth rates.

Amdahl's 1989 annual revenue was expected to grow by about 18%. Growth through September 1989 was 17%, although earnings were down sharply and profit margins from continuing operations have eroded by about 5 points. This occurred despite April 1989 product price increases, implemented following a similar move by IBM. Although Amdahl was not willing to comment about this subject specifically, apparently both IBM and Amdahl have increased list prices to permit deep discounting on installations on a case-by-case basis.

Service Demographics

Amdahl employs approximately 1,025 hardware and software service personnel in the U.S., of which 659 work from either of 115 different field service locations or 156 parts depots. Software support comprises about 40% of the direct field workforce. U.S. service revenue per direct field employee is in excess of \$300,000; annual service revenue per employee for the entire U.S. service organization is approximately \$129,750—significantly above the information technology industry average.

Approximately 99% of Amdahl's users place the system on a maintenance contract immediately upon expiration of the warranty period.

Total U.S. service revenues increased by only 6.5% from 1987 to 1988, indicating continued downward pressure on rate structures by competitors and end users. Worldwide service revenues seem to have increased during 1988, compared to INPUT's estimates of the previous year's data.

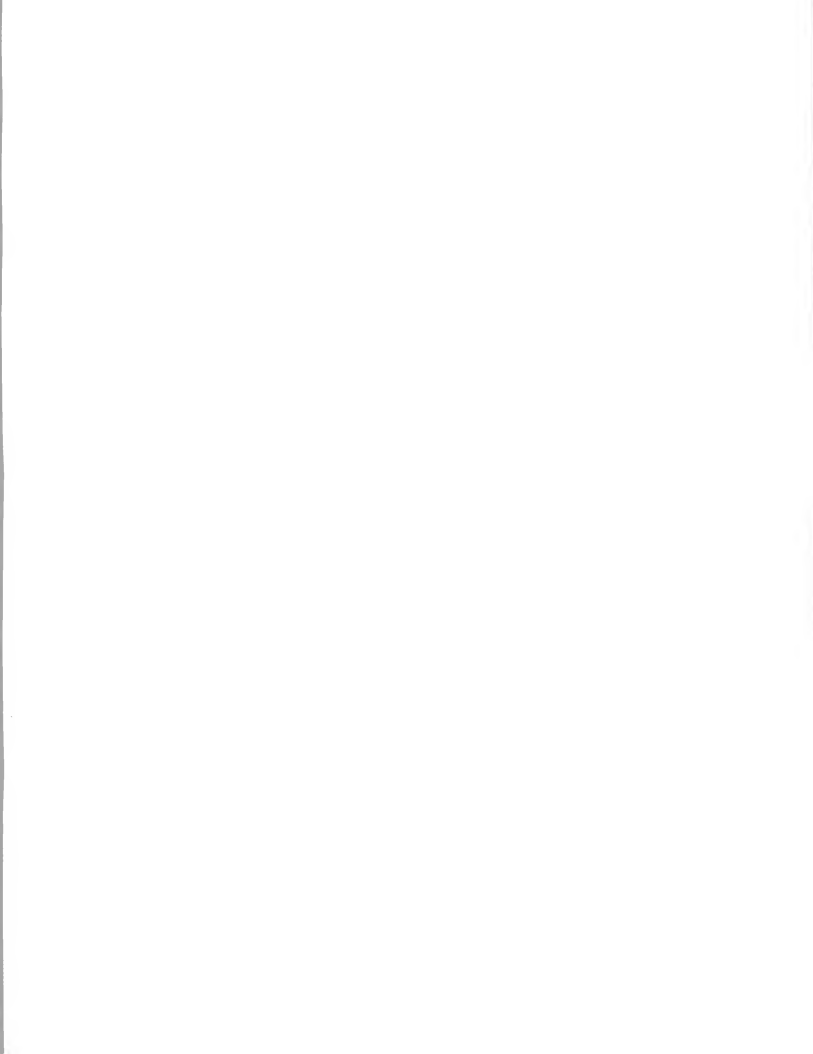
Amdahl seems to be placing much greater emphasis on field software support, judging from the year-to-year changes in its skills profile in the field. The field software support headcount increased by approximately 75% during 1988, while the hardware maintenance engineer headcount in the field declined. The overall customer services headcount in the U.S. organization rose slightly less than 8%, according to INPUT's analysis.

Presenting Amdahl service offerings to the customer is the responsibility of the product/system selling organization.

Service Delivery

Amdahl provides typical manufacturer's services—warranty, hardware maintenance, software maintenance, service training, installation and relocation support, hardware conversions and/or upgrades, telephone support and data center design. The company has not yet moved to directly provide equipment refurbishment or disaster recovery services, as have many other mainframe suppliers.

The company provides 24-hour, 7-day-per-week coverage as part of its standard on-site service contracts. Its response time objective, not contractually committed, is two hours. INPUT research indicates that the company is more than achieving its response goal, and Amdahl claims that "most operations can be restored in less than 30 minutes" in severe cases when a system is down. In case of system failure, Amdahl users call a toll-free customer support number to obtain immediate technical assistance over the telephone. If on-site service is necessary, dispatch is handled through the central support center.



All Amdahl CPUs contain an integrated control processor which facilitates on-site diagnosis of the system. Amdahl is believed to be a pioneer in the field of automatic remote diagnostics, which are utilized by central support personnel to predict problems rather than waiting for actual failures. The company claims that the new 5990 series has advanced reliability, availability and serviceability features including error detection and correction, monitoring, and diagnostic facilities.

Strategic Commentary

Amdahl does not offer a time-and-materials program as an alternative to contract coverage. The company will provide support for compatible peripherals which are attached to Amdahl systems but may have been obtained by the customer through other channels. Support for software is included in Amdahl's monthly maintenance charges. Support for third-party products (hardware or software) has been offered to customers on a case-by-case RPQ basis.

Amdahl is developing standard baseline programs for multivendor support and other services, which it plans to customize on a special request basis, without the complexity of the formal RPQ process. Amdahl's marketing and service support focus will continue to be on supporting needs of current Amdahl customers, or prospects who need additional services and support as part of an Amdahl product procurement. The company does not intend to pursue service revenue opportunities outside of its mainframe market niche.

The company provides a diverse range of professional and educational support services from each of its seven region education centers and its national education center in Santa Clara. Amdahl's Systems Consulting Services Group offers a wide range of on-site professional services in such areas as network design and planning, system performance analysis and tuning, storage, and configuration management.

Amdahl's service revenues are in the range of 15% to 18% of total worldwide company revenues, compared to an industry average nearly 10 percentage points higher. This could indicate a significant opportunity for the company to further expand its service operations.

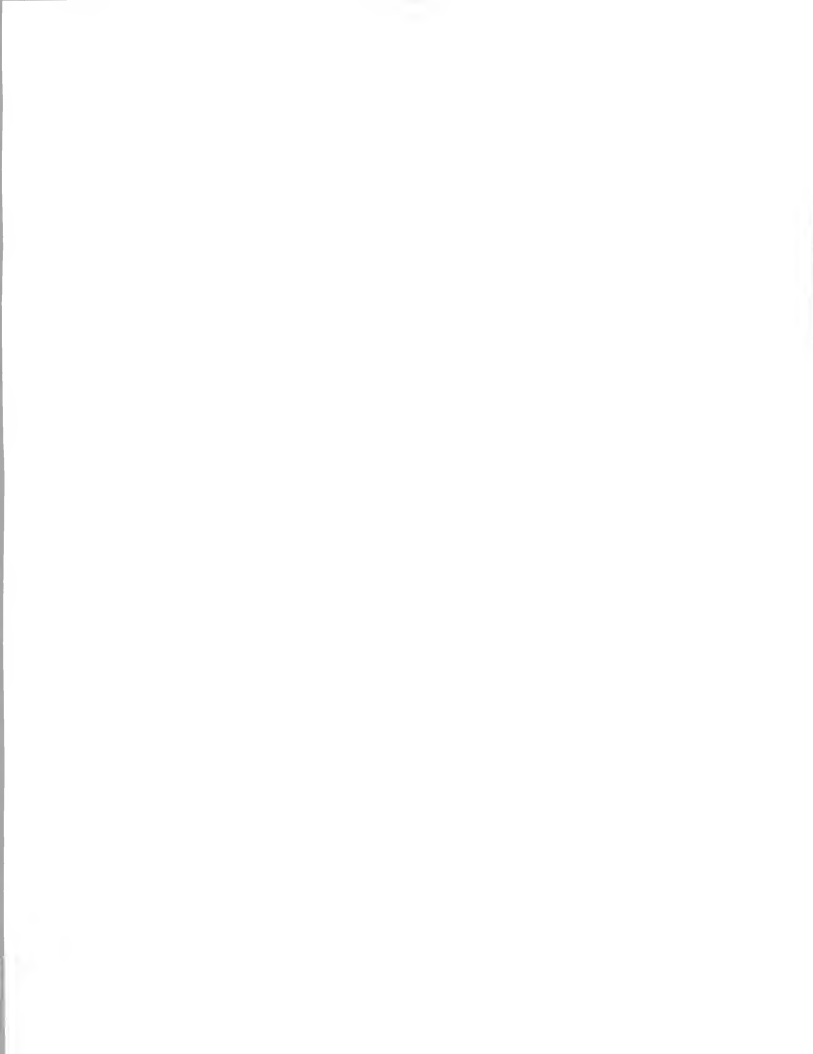
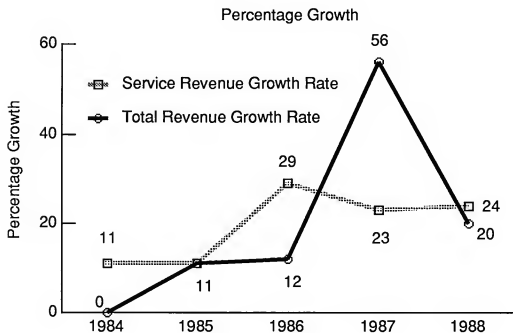
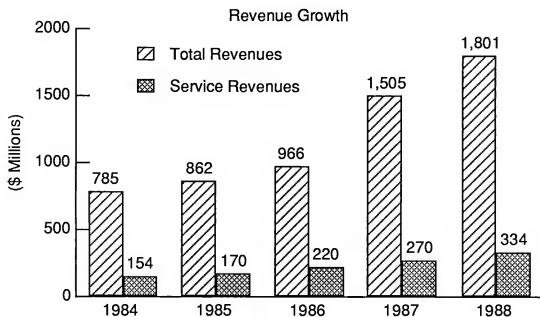


EXHIBIT II-1

**Amdahl Total Company and
Service Revenue Growth**

COMPANY PROFILE

**BULL HN INFORMATION
SYSTEMS INC.**

300 Concord Road
Billerica, MA 01821
(508) 671-6000

Roland D. Pampel, President and CEO
Owen F. Keefe, Vice President,
Customer Service Operations
Total Employees: 18,000
Total 1988 Revenue: \$2,200 million
Total 1988 Service Revenue: \$640 million*

* INPUT estimate

The Company

In 1987, Honeywell Inc. sold to Compagnie des Machines Bull, a French corporation, and to NEC Corporation, 42.5% and 15%, respectively, of the issued and outstanding stock of its subsidiary, Honeywell Information Systems, Inc. The company was renamed Honeywell Bull Inc., as INPUT reported last year. On December 29, 1988, Honeywell exercised its right to require Compagnie des Machines Bull to purchase an additional 22.6% of the stock, thus reducing Honeywell's interest to 19.9% and increasing Groupe Bull's interest to a controlling 65.1%; Honeywell Bull became Bull HN Information Systems Inc. Subsequent transactions have raised Groupe Bull's stake to 69.4%, and lowered Honeywell's equity to 15.6%.

Bull HN Information Systems is a U.S.-based, worldwide information systems company that develops, manufactures, markets, and sells computer products and systems. Honeywell Federal Systems Inc. markets, installs and supports data processing systems and equipment acquired primarily from Bull HN Information Systems, Inc.; HFS' primary customer is the U.S. government, and HFS is Bull HN's marketing arm to this business segment.

The combined revenue base of the Groupe Bull family is more than \$5.2 billion, making Groupe Bull one of the 10 largest information technology companies worldwide. Bull HN's sister company, Bull S.A., is a European company in which the French government still has a majority interest. Relationships between NEC, Honeywell and Compagnie des Machines Bull date back to the early 1960s.

In October 1989, Groupe Bull and Zenith Electronics announced an agreement under which Groupe Bull would acquire Zenith Data Systems and Heath Zenith. The \$1.4 billion (revenue) Zenith electronics operation is planned to be managed as a separate entity under Bull HN Information Systems, giving Bull HN a 7% market share among commercial PC users, and a major presence in the laptop and portable PC market. Bull HN has been a major OEM customer of Zenith, and Zenith has been especially strong in the U.S. government business sector. Stockholder approval of the transaction was expected by year-end 1989.

Service Demographics

Bull HN's U.S. marketing, sales and service operations employ about 8,900 people. Of these, approximately 2,300 are service employees working from approximately 195 different locations (several walk-in or mail-in repair centers) and 60 parts distribution "clusters." Slightly less than half of the U.S. service employees are "traditional" CEs with hardware maintenance responsibilities.

INPUT estimates that U.S. service revenues are about \$315 million, which would place Bull HN in the U.S. at \$137,500 revenue per service employee. More detailed information is not available, due to the "closely-held" nature of the company.

Bull HN's National Response Center in Atlanta, GA is accessible 24 hours a day, 7 days a week by means of a toll-free number; the NRC provides central dispatch and maintains a problems-resolution data base containing the complete equipment service and performance history of every Bull HN customer. Three Technical Assistance Centers provide on-line remote diagnostic support for customers and CEs on selected systems. TAC center personnel also provide verbal technical assistance to CEs when the latter are resolving problems on site.

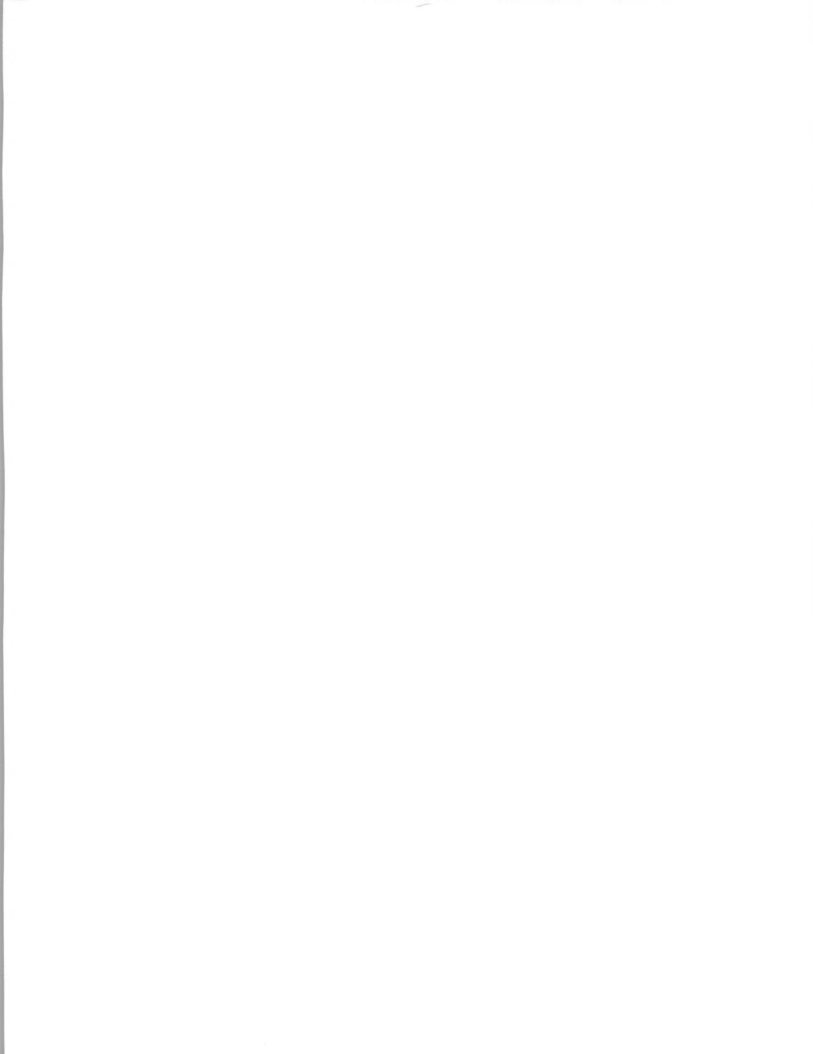
Bull HN has indicated that the acquired Zenith Data Systems business will continue to operate as a separate unit. ZDS employs about 4,000, and its 1988 service revenues were about \$60 million, up 31% from the previous year.

Service Delivery

Bull HN's standard hours of coverage are "normal" business hours, Monday through Friday. Response times may be either commitments or goals, depending upon the contract with the customer, and may range from four hours for PC and workstation products to two hours for large and midrange systems users.

Bull's program of comprehensive services is referred to as TotalCare Service. The company advertises hardware, software and network support; remote, on-site and customer-assistance maintenance programs; and logistics and customer training, all of which are managed through or by the National Response Center. The company has incorporated artificial intelligence into the diagnostic process for CEs to use prior to arriving at a customer site.

Bull offers a Premium Service Program for large systems and DPS PLUS systems, with coverage around the clock, seven days a week. Offerings include guaranteed response-time credits, preventive maintenance during scheduled extended maintenance periods, equipment installation, ECO installation, and equipment malfunction protection credit.



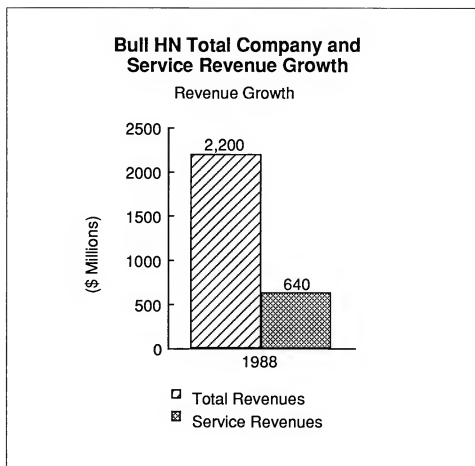
Bull HN also offers TotalCare TPS (third-party service) for network and peripheral products from more than 50 different manufacturers. Bull's third-party support effort applies to all of its standard and customized service programs.

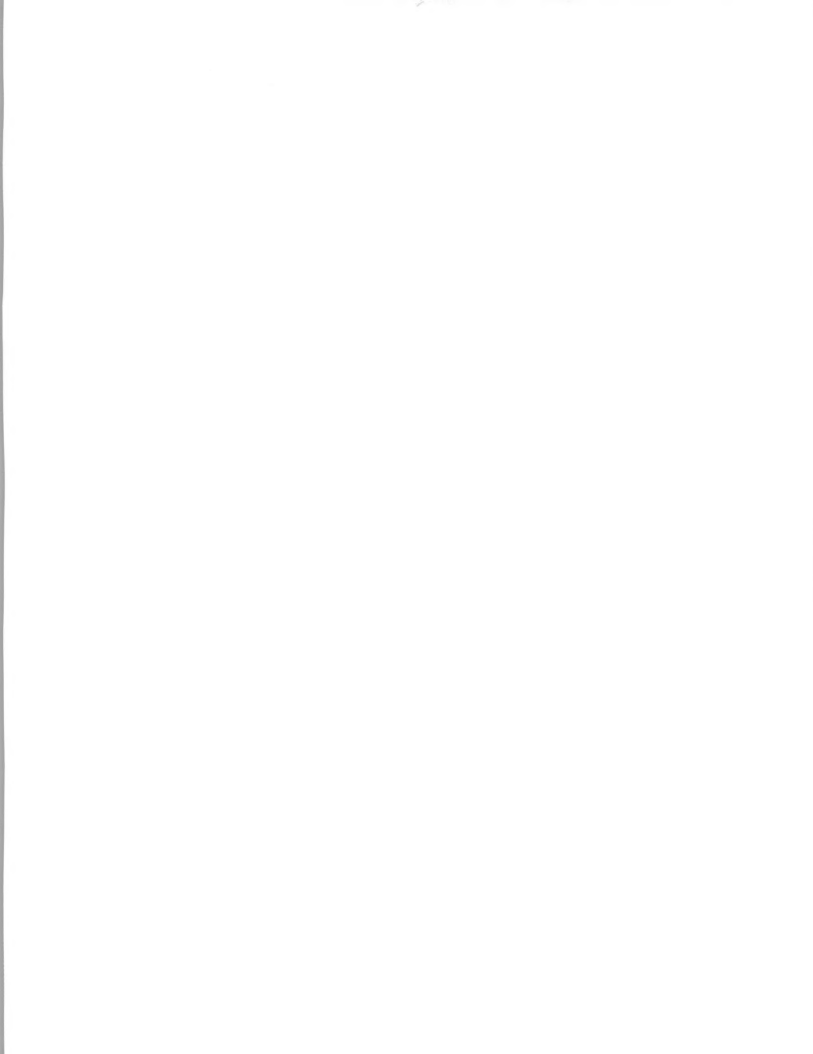
Strategic Commentary

Bull HN's service programs are comprehensive and profitable. The last year seems to have been dedicated to internal matters necessitated by the change in corporate ownership late in 1988—there has not been the steady stream of service announcements from Bull that have been characteristic of other companies in this market.

INPUT believes that the company has already integrated the various service functions involving hardware, software, data communications and network support, and will focus its efforts during the next few years on improvements and refinements, rather than on spectacular activities.

EXHIBIT II-2





COMPANY PROFILE

**CONTROL DATA
CORPORATION**

8100 34th Avenue South
P.O. Box 0
Minneapolis, MN 55440-4700
(612) 853-4069

Robert M. Price, Chairman and CEO
Larry W. Schulze, Vice President,
Computer Systems Maintenance
Total Employees: 33,500
Total 1988 Revenue: \$3,628 million
Total 1988 Service Revenue: \$412 million*

* INPUT estimate

The Company

Control Data Corporation, founded in 1957, provides computer services and products for business, scientific and engineering applications worldwide, according to the company's 1988 annual report. CDC supplies customers with information, data processing and systems integration services, as well as maintenance for its mainframe and supercomputer products. Until recently, CDC was one of the larger providers of third-party hardware and software maintenance services in the U.S.

According to CDC management, application-specific systems integration businesses are of increasing importance. CDC's Energy Management Division helps electric utilities control power generation, transmission and distribution. Micrognosis provides automated systems which simplify brokers' and traders' access to financial information services. Ticketron's automated wagering business continued to grow in 1988. CDC's Government Systems Division was awarded a \$120 million contract to develop the USAF Advanced Tactical Air Reconnaissance System (ATARS) in 1988, which is expected to provide significant business in the 1990s.

According to CDC, information services and business management services also continue to grow, and are thought to be important sources of future revenue.

For the year ended December 31, 1988, CDC reported net earnings of \$1.7 million on revenues of \$3,628.3 million, a decline in profits of 91%, even though worldwide revenues increased approximately 7.8%. The company scaled back total employment during 1988, and INPUT understands that additional reductions were made during April 1989. Revenues declined by 8.8% in the Computer Systems & Services segment, due to later-than-planned shipment of the new CYBER 960 midrange systems, and lower orders for the CYBER 990 upper-range systems. The majority of the company's revenue from mainframes was from non-U.S. markets.

Revenues also decreased in CDC's maintenance services business, due to generally lower prices on newer generation products and longer warranties necessitated by competitive practices. Some increase in CDC's third-party maintenance revenues partially offset declines in service revenue on its own products. Cost reductions in maintenance services, begun during 1987, helped improve CDC's gross margins during 1988.

CDC had a (marginally) profitable 1989 third quarter, although cumulative nine months earnings are still negative.

Service Demographics

In 1988, CDC sales literature indicated that the service headcount was in excess of 4,000, including management and support professionals and technicians. INPUT currently estimates that this headcount has been adjusted downward, to approximately 3,600 services personnel, operating from about 100 different facilities in the U.S. The headcount is likely to be reduced by another 1,000 as the result of the pending sale of CDC's third-party maintenance business to Bell Atlantic's Sorbus unit.

In June 1989, CDC sold its European third-party maintenance business, estimated to generate about \$25 million revenue annually, to Thomson CSF SA. Lawrence Perlman, CDC President and COO, has been quoted as saying that the third-party maintenance business no longer fits into the company's "strategy to be a data solutions company."

CDC has developed an extensive portfolio of programs for IBM equipment ranging from Series/1 to the IBM 3090, and has released many enhanced service offerings for DEC VAX/VMS systems managers. The customer base being sold to Bell Atlantic in the U.S. is thought to include 6,000 accounts and as much as \$85 million in annual revenues.

The 80,000 readers of *Digital Review* newspaper, who are focused on DEC systems use, judged CDC to be the best third-party vendor of DEC hardware and software support in 1989.

Service Delivery

CDC provides a 24-hour toll-free number for all customers requiring hardware or software support. The company's Computer Systems Maintenance (CSM) organization uses an Incident Management System to dispatch CEs to customer sites. For complex problems, CSM maintains a central support team that provides technical hardware and software support to customer engineers in the field.

CDC's standard service coverage is 11 hours per day, 5 days per week. CDC typically guarantees a two-hour response for all calls which require on-site service. CDC offers a unique extension of its standard coverage—in the event the CE has not completed repair during standard coverage hours, CDC commits to staying on-site until repair is complete, with no additional charge to the customer. CDC also offers a deferred response time agreement at discounted rates.

Strategic Commentary

This past year has been one for repositioning, restructuring and general downsizing of CDC's operations in order to narrow its focus on the services and systems integration portions of its business, and to restore cash flow and working capital to more acceptable levels. On June 12, 1989, CDC announced the divestiture of Imprimis Technology, Inc. to Seagate for \$450 million in cash and securities. Earlier in the year CDC sold its Control Data Institutes in Europe and the U.S., and closed its ETA supercomputer subsidiary.

CDC seems to be moving toward being a very focused information services company, and may even be attempting to increase its mix of business from the government and scientific computing sectors. The sale of Imprimis will reduce CDC's annual revenue to approximately \$2.5 billion, of which 48% will be derived from computer systems and services and 36% will be generated from information services.

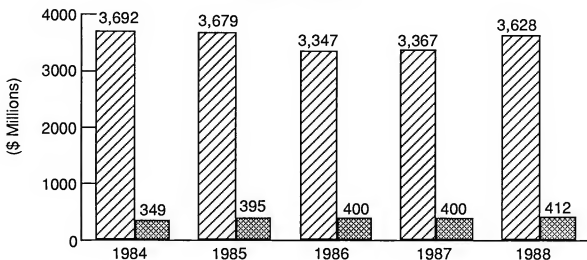
Although CDC will continue to support its own customers in a multivendor environment, it is also easy to believe that the TPM business divestiture transaction to Bell Atlantic could result in a very strong alliance between CDC and Sorbus, for those CDC customers who require service and support for large-scale, multivendor product environments.



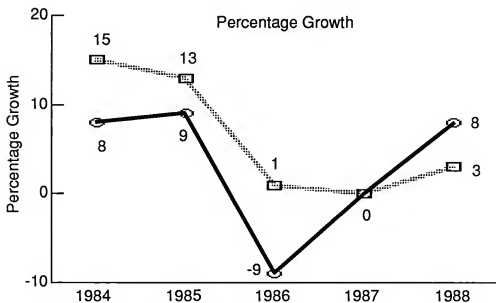
EXHIBIT II-3

CDC Total Company and Service Revenue Growth

Revenue Growth



- Total Revenues
 Service Revenues



- Service Revenue Growth Rate
 Total Revenue Growth Rate

COMPANY PROFILE

HITACHI DATA SYSTEMS CORPORATION

750 Central Expressway
P.O. Box 54996
Santa Clara, CA 95054-0996
(408) 970-1000

Gary B. Moore, President and CEO
Alfred R. Mascha, Vice President,
Worldwide Customer Service & Support
Total Employees: 2,200
Total 1989 Revenue: \$900 million*
Total 1989 Service Revenue: \$138 million*

* FY ending 5-31-89

The Company

On October 23, 1989, National Advanced Systems (NAS) announced that it had changed its name to Hitachi Data Systems Corporation, reflecting joint ownership of the firm by Hitachi Limited (80%) and Electronic Data Systems (20%). The roots of HDS go back to the early 1970s, when National Semiconductor Corporation and Hitachi sold mainframe computers and peripherals through Intel Corporation; in 1979, National Semiconductor purchased Intel's computer operations and founded NAS.

During 1988, National Semiconductor began to "shop" the business, and in January of 1989, an agreement was reached with Memorex Telex N.V. to form a joint venture in which each would own 50% of NAS. Apparently there were a number of other suitors, but Hitachi had stronger ties to NAS than any other bidder. NAS is Hitachi's largest worldwide distributor of IBM-compatible large- and medium-scale central processing systems, including CPUs, disk, tape and solid-state storage subsystems.

National Semiconductor's Information Systems Group, of which NAS was the major revenue contributor, has grown from \$552.6 million revenue in 1984 to \$1,100.0 million in 1988, but has apparently been a drain on National Semiconductor's earnings recently due to deep discounting in the mainframe market and the strength of the Japanese yen.

Hitachi Data Systems' AS/EX™ series of 15 high-performance mainframes includes six uni-processors, four dyadic processors, two two-way processors, one three-way processor and two four-way processors. HDS' intermediate systems are used in CAD/CAM, front-end processing, banking transaction processing, and general commercial applications. HDS' large systems are used in high-volume on-line and batch processing, engineering and scientific computing, and large-scale distributed processing.

HDS' high-capacity disk drive family is compatible with the IBM 3380 product line. HDS' cartridge tape subsystems provide up to 400MB of storage.

Service Demographics

Hitachi Data Systems has more than 870 customer service representatives working from over 100 offices worldwide, providing technical field support, equipment maintenance and account management services. Hitachi Data Systems also offers standard and customized training courses that cover a broad range of computer systems equipment and software, including IBM operating environments: VM, MVS and DASD management, languages, data base systems, networks, and communications. HDS offers optional expert systems that proactively predict failures in large-capacity disk drives, and allow HDS customer service personnel to take corrective actions before problems affect the customer's business.

INPUT estimates that software support personnel now make up 25% of the service workforce. The average experience of HDS' service and support personnel is reported to be more than 12 years in the large-systems arena.

The HDS Customer Support Center, located in San Diego, CA, provides around-the-clock hardware and software support to both customers and HDS personnel. HDS maintains an education center for hardware and software training, a repair facility and an East Coast technical support group in Lanham, MD. HDS' Corporate Resource Center, located in San Jose, CA, supports a worldwide logistics network.

Service Delivery

HDS provides hardware and software support and repair, centralized dispatch, systems programming, consulting, education, around-the-clock access to the Customer Support Center, worldwide logistics support, product performance tracking systems, on-line equipment service reporting, service management of complex environments, capacity management and systems contract services.

HDS offers a standard 24-hour-a-day, 7-day-a-week maintenance contract with committed or estimated variable response times, based on customer requirements and contract provisions.

HDS optimizes physical and configuration planning using computer-aided design tools. Customers can contract for HDS CAD services, choosing other options such as planning for security systems, power and water runs, and telecommunications networks.



HDS offers Primary Vendor Management, whereby HDS not only resolves problems with its own equipment, but also works with CEs from other companies to diagnose equipment problems.

Virtually all HDS systems are placed on maintenance contracts upon expiration of the warranty term. Customer Service takes a primary role in explaining service offerings to customers and prospects, and providing marketing support materials describing service offerings and programs. According to President Gary Moore, the customer service function has been "elevated ... up two levels in the organization" within the last half of 1989.

Strategic Commentary

After more than a year of significant pressure on earnings, and major uncertainty due to National Semiconductor's desire to divest itself of some or all of its product operations, Hitachi Data Systems seems to be well positioned to take advantage of the products and technology offered by its controlling owner, Hitachi Limited. In addition, the minority interest of Electronic Data Systems suggests that HDS will be able to compete more effectively and aggressively in the expanding systems integration market, of which IBM now holds a commanding share in the hardware segment.

Comments by HDS service executives suggest that revenue from third-party maintenance programs is expected to grow at a 20% annual rate, indicating that HDS management feels enthusiastic about the SI opportunities for its hardware and multivendor services.

President Gary Moore is placing significant emphasis on customer satisfaction, quality and reliability. He has stated, "The only sound way to grow this business is by paying attention to customer satisfaction." For the first three years of HDS operation, profits are expected to be totally reinvested in HDS, so as to build an infrastructure that will allow HDS to meet its customer satisfaction and business plan goals.

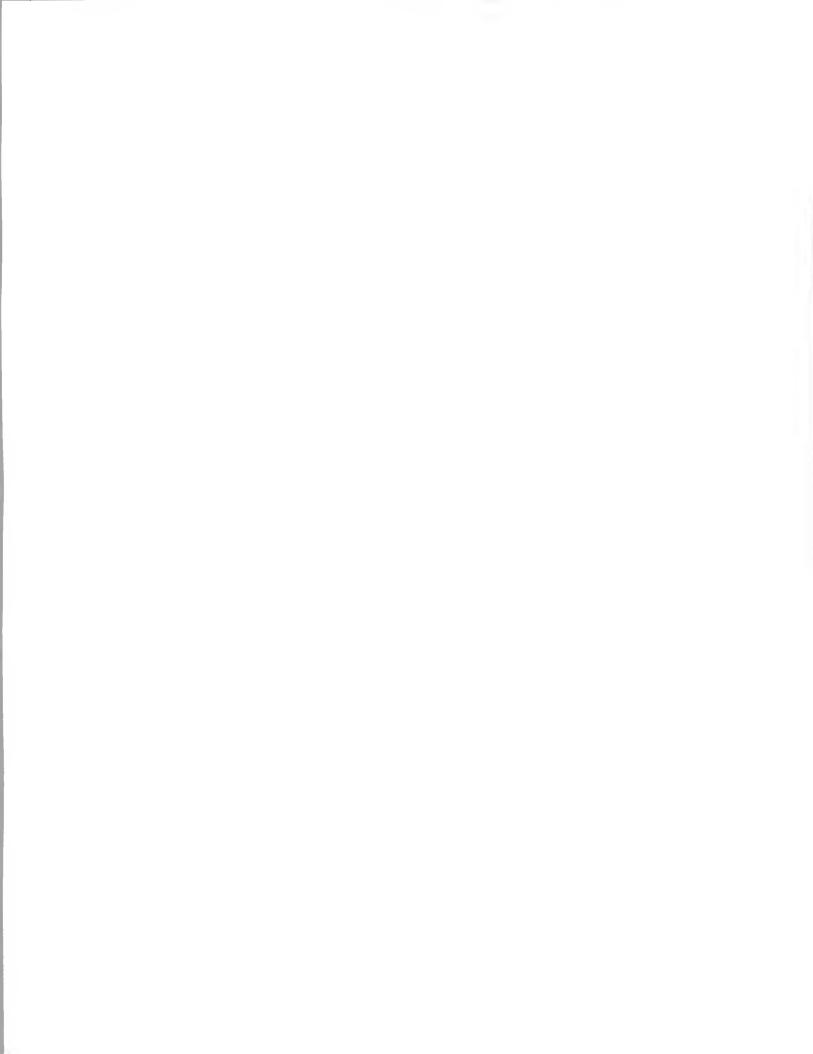
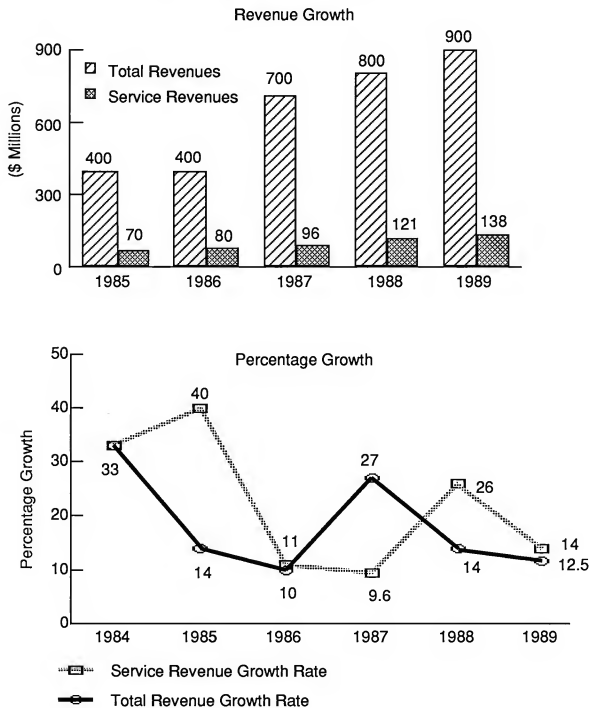


EXHIBIT II-4

Hitachi Data Systems Company and Service Revenue Growth



COMPANY PROFILE

IBM CORPORATION

Armonk, NY 10504
(914) 765-1900

John F. Akers, Chairman
David E. McDowell, President,
National Service Division
Total Employees: 387,112
Total 1988 Revenue: \$59,681 million
Total 1988 Service Revenue: \$7,347 million*

* Separately billed charges for maintenance

The Company

IBM is the leading provider of large-scale information processing systems and services to all industries, with annual revenues four to five times greater than its largest competitors in the information technology business sector. IBM commands an 87% share of the large-systems mainframe market.

IBM worldwide revenues have been growing (erratically) at a compound annual rate of under 7% since 1984. Earnings per share and return on stockholders' equity are still below 1984 levels, and 1989 earnings are likely to be lower than 1988 earnings, even considering IBM's traditionally strong fourth quarter. IBM's third quarter 1989 profits are down 30% from the comparable period last year, cumulative 9-month profits are almost flat, and 1989 operating margins for the third quarter have eroded by 3 points. Return on stockholders' equity continues to be below 15%, compared to 26.5% in 1984.

INPUT believes that IBM's lower-than-desired revenue and profit growth can be attributed to its aggressive price reductions and greater expenses for new maintenance programs in the U.S. In 1986, revenue from U.S. maintenance services was \$4,016 million; in 1988, revenue in the same category declined to \$3,102—22.8% reduction in two years! A 25% maintenance services revenue growth rate outside U.S. operations in the comparable 1986-1988 period kept total worldwide maintenance services revenue essentially equal to last year's reported figures.

IBM's worldwide maintenance services revenue are 12.3% of total corporate revenues, about 10 points less than the industry average, and as much as 20 points lower than several large competitors such as NCR, Unisys, Control Data and Bull HN. IBM therefore enjoys significant competitive leverage relative to its systems competitors when it adjusts its maintenance programs to become more attractive in the information technology marketplace.

IBM revenues from rentals and financing have shrunk during the last five years from 15% of total revenue to about 4%. The relative importance of software has almost doubled during the same time, from 7% in 1984 to 13% of total worldwide revenues in 1988. Gross profit margins for IBM software exceed 70%!

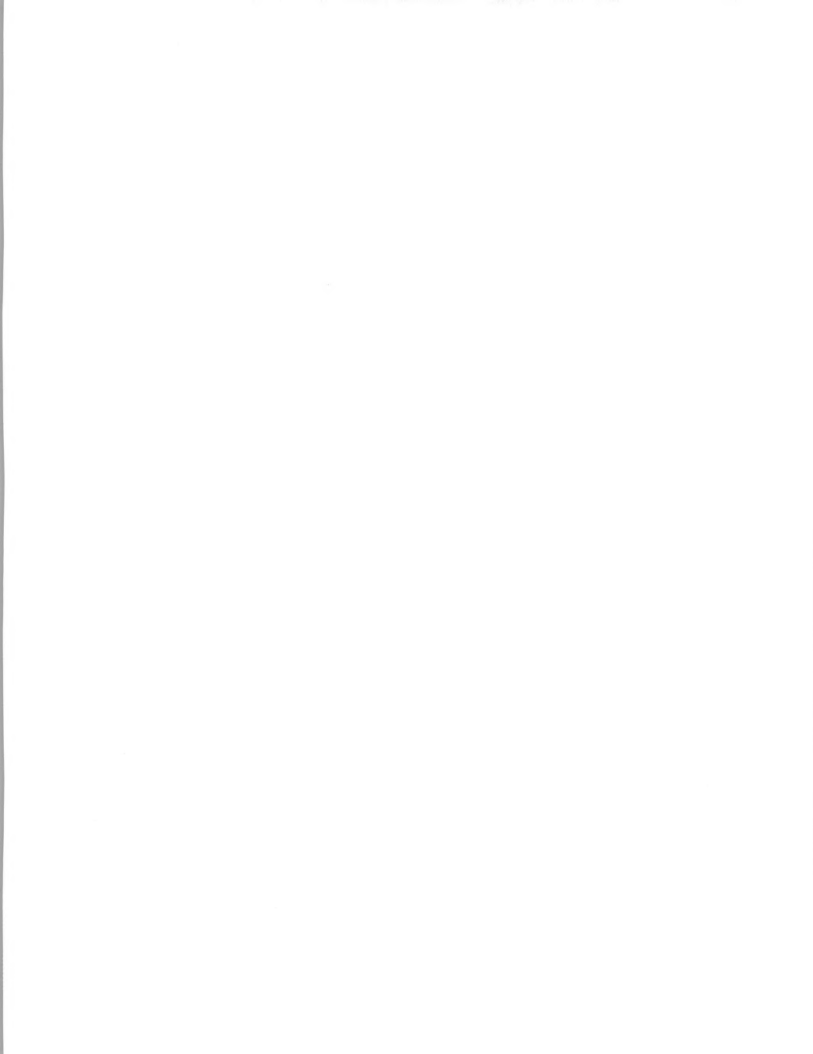
IBM's longer-term master plan for restoring revenue and earnings growth seems to revolve around its release of Systems Application Architecture (SAA), a software scheme it devised in 1987. On May 16, 1989, IBM announced software to tie its mainframes (the AS/400 mini-computer and the PS/2) together for what it calls cooperative processing. SAA specifications have been released by IBM to the industry, and other manufacturers are being encouraged to adapt their products to this new architecture. It is hoped that SAA will enable the largest accounts to network their corporatewide information systems together for improved accessibility and credibility of data used to operate their businesses.

IBM also seems to be refocusing and narrowing its concentration on information technology and related services. While purchasing minority interests in companies such as Computer Task Group, a 23-year-old \$200 million (revenue) company providing systems software, engineering, and systems integration consulting services, IBM finally completed an agreement that gives Siemens ownership of Rolm Systems, which IBM acquired in 1984. IBM will take joint ownership with Siemens in the Rolm Company, which will sell and service Rolm's products and Siemens' private network telecommunications and ISDN capabilities to customers in the U.S.

Service Demographics

According to W. Wilson Lowery, Jr., who until recently was Vice President, Service Business Development, NSD, IBM has been placing emphasis during this past year upon enhancing the value of its basic maintenance services and streamlining its business practices and procedures. Customers have seen a rapid and extensive series of new service program announcements, some of which reduced prices considerably. IBM has been internally addressing concerns in four areas—service quality, investment in new service technology, business practice simplification and introduction of more-personalized services.

INPUT estimates that IBM's U.S. service organization employs approximately 27,000 people, of which 5,000 are dedicated to remote service facilities and 17,000 are field engineers operating from 233 business locations nationwide.



Service Delivery

All IBM system user maintenance customers receive 24-hour, 7-days-per-week coverage as part of their standard maintenance agreement. Customers are assured of spare parts availability by IBM's Parts Inventory Management System, which tracks spares through two national distribution centers, 21 regional parts centers, 323 branch office locations, and countless parts vans and CE toolkits. Each CE carries a lightweight portable terminal developed for IBM by Motorola, which links the CE using RF or hardwired data communications to an extensive network of technical support including dispatch, spare parts handling, service call reporting and diagnostic routines.

On January 24, 1989, IBM announced the ServicePlan™, which "consolidates all IBM service offerings into one simplified contract, and provides customers with a number of savings opportunities." Highlights of the new program include reduction of contract documentation from more than 25 separate agreements to one; implementation of an estimated single invoice for service based on projected annual maintenance needs; multiple-year prepayment discounts ranging up to 50% under the Extended Maintenance Option (EMO); inclusion of locally-attached PCs and terminals to the CSA discount plan; extension of the MRSA agreement and associated discounts to high-end processor users, thus reducing the stringent self-help constraints of CSA on high-end customers; elimination of the requirement to have either a Rolm PBX or an IBM processor to participate in IBM's Telecommunications Services Network Support plan; and extension of new IBM service plans to IBM Remarketers.

Under the IBM Remarketer End-User Service Plan, authorized VARs may sell IBM service contracts and the EMO directly to their customers without IBM intervention. VARs may package the IBM programs with their own offerings, and the reseller is free to do what he wants with IBM's discounts.

Effective March 8, 1989, IBM further strengthened the relationship between customer and VAR by extending its service programs to its Business Partners or C-level dealers representing the PS/2 and IBM PC. The Entry Systems Service Amendment (ESSA) enabled Business Partners to take advantage of the relationships and packaging alternatives offered to Remarketers of the AS/400 earlier in the year. IBM announced that, where appropriate, it would initiate on-site assistance from IBM CEs to help Business Partners solve particularly difficult problems, providing this technical support at no charge to the Business Partner.

IBM also improved the availability of emergency repair parts support to its Business Partners as part of this release. A new stock balancing program will result in a 10% increase in parts available to dealers under its spare parts exchange program, reducing dealers' dependency upon parts shipped directly from the factory.

It is clear that IBM is allowing dealers to become the primary source of support for its PS/2 and related entry-level products. Under ESSA, non-servicing dealers can earn a 10% commission for selling IBM service agreements. In the spring, IBM established a 12-member Service Advisory Council to communicate better with dealers on its new service programs, and to address any shortcomings in the plans.

In March, Service Director, a PS/2 Model 80 with proprietary software to monitor storage-system performance, was announced. The unit has been programmed to call up a local service center to alert an IBM expert system program when a problem occurs. The expert system analyzes data, recommends a corrective service procedure, and can even dispatch a CE and replacement parts. The system works with IBM's 3380, 3880 and 3890 disks, and 3480 tape storage systems. Service Director is being enhanced to include printers and other peripherals.

On October 3, 1989, IBM made another series of announcements of enhanced support options for its AS/400. The package consists of three options: Customized Operations Services Express (COSE), which covers preparation of an AS/400 installation; Installation Quickstart, which is the actual installation; and Systemxtra, which is ongoing hardware and software support. COSE will be available in January 1990. The release includes an expert system, Problem Management Productivity Services (PMPS), which is designed to replace a typical manual help-desk system of logging user complaints and finding resolutions in documentation. PMPS will prioritize problems, and has been programmed to automatically alert IBM support personnel if the problem is hardware-related and requires maintenance service from IBM.

The Network Traffic Analysis offering links a customer to an IBM support facility in Gaithersburg, MD, for SNA network problem-solving. Four software components make up the offering: Virtual Route Performance Monitor, which gathers data from trace facilities; Virtual Route Configuration Monitor, which stores customer system configuration for reference; Virtual Route Calculator, which lets users optimize response times on their networks; and Virtual Route Analyzer, which identifies possible network configuration bottlenecks which may be causing poor response time.

During 1989, IBM also aggressively entered the disaster recovery business, with Business Recovery Services, offering backup services from two 3090 system centers and regional small and midrange facilities; it has formed or hinted at alliances with major systems integrators. IBM offers customized site management and network management services, and has offered to tailor any or virtually all portions of its programs to individual customers' needs.

During 1989, IBM also made a strong entry into the systems operations market, taking over data center operations for several major companies. Some of these contracts have been in partnership with computer software and services vendors. This important development is analyzed in INPUT's *Systems Operations Market* report.

As part of its approach to accommodating customers' every need, IBM now covers more than 2,000 non-IBM products from over 225 manufacturers in its Multi-Vendor Service programs, pledging to manage, coordinate or perform services as required in even an all-non-IBM environment.

Strategic Commentary

According to Wilson Lowery, the IBM service mission is to reduce service costs, enhance customer control of the computing environment, and enable customer growth by offering a full range of support services tailored to individual needs. INPUT believes that IBM has recognized the potential of superior services to pull products through to the marketplace, as well as the growing thirst of customers to use information technology as a competitive advantage in their individual market sectors.

IBM is apparently very satisfied with the progress being made by National Service Division management—in January 1989, Dave McDowell was elected as an IBM corporate Vice President.

Customers have been eager to increase their own focus on the business they know best, leaving service and support to systems integrators and other third parties. IBM is increasing its potential to sell more hardware by becoming more flexible, and by partnering with its customer base.

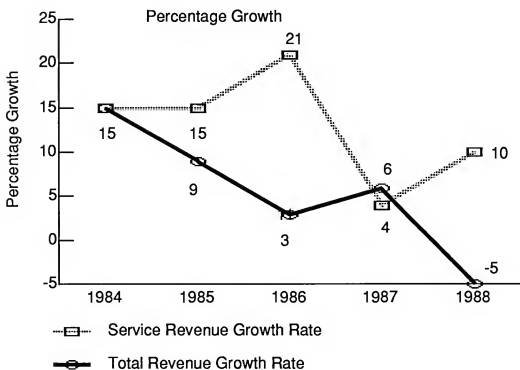
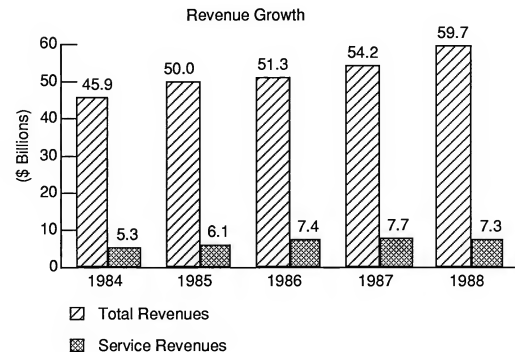
Though revenue and earnings growth during the next two years will continue to be difficult for IBM, the longer-range strategy is likely to pay off handsomely. Competitors in the information technology industry are much more dependent upon substantial service revenues and profits for overall acceptable financial results, which will make competitive reaction to current IBM service program tactics difficult to match or beat!

Information system executives in major corporations will be able to spend more time on information strategies to improve their business results, leaving operations tactics to IBM, which seems to be a win-win proposition.

Independent third-party service organizations may suffer most—the alternative to IBM maintenance may be IBM itself!

EXHIBIT II-5

IBM Total Company and Service Revenue Growth





COMPANY PROFILE

NCR CORPORATION
1700 South Patterson Blvd.
Dayton, OH 45479
(513) 445-5000

Charles E. Exley, Jr., Chairman and CEO
Richard B. Reese, Vice President,
Customer Services
Total Employees: 60,000
Total 1988 Revenue: \$5,990 million
Total 1988 Service Revenue: \$2,097 million*

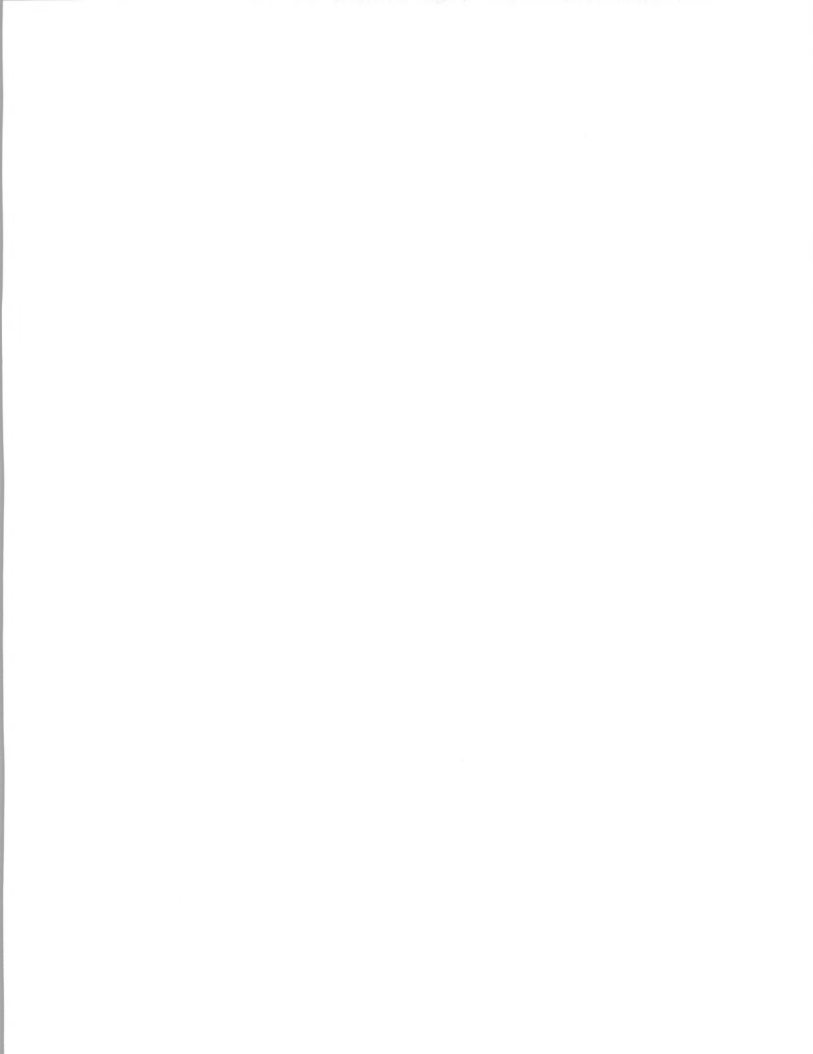
* Includes software maintenance, custom programming and data center services

The Company

NCR is a major provider of information systems products for worldwide markets. The company's products include industry-specific workstations; industry-specific products for retail, financial, manufacturing and other markets; general-purpose workstations such as personal computers, office automation workstations and video display terminals; multiuser computer systems including small and medium computer systems for departmental use, and systems for interactive and batch processing; large computer systems for on-line transaction processing and batch processing; communications processors that process information between large computer systems and a variety of data communications devices such as terminals; and semiconductors, data centers, field engineering services, software services, education, business forms and supplies, and financing alternatives.

In late 1989, BusinessLand announced it was contracting with NCR to resell the NCR family of PCs to replace the Compaq product line, which was discontinued by mutual agreement earlier in the year.

Approximately 39% of NCR's product revenues in 1988 were generated from industry-specific workstations for the retail and financial markets, two segments in which NCR is powerful. In 1988, NCR's retail workstation revenues declined 4%, after two relatively flat prior years. Financial workstation revenue grew 19% in 1988, compared to 17% in 1987 and 22% in 1986. Financial revenue gains were driven primarily by major gains in worldwide sales of automated teller machines.



NCR's small and medium multiuser computer systems sales declined 6% in 1988, following a 32% increase in 1987. Significant gains are still being made by the NCR TOWER family of super microcomputers.

NCR achieved another record year, financially, during 1988. Total revenue increased 6%, net income rose 5%, net income per share rose 18%, working capital improved by 21%, and return on stockholders' equity reached 20%, more than 5 points higher than IBM. NCR derives 41.7% of its revenue from the U.S. and 33% from European operations.

Service revenues, consisting of hardware and software maintenance, custom programming, and data processing services, rose 7% in 1988, after gains of 13% in 1987 and 16% in 1986. The 1988 growth rate was driven primarily by strong gains in custom programming services and software maintenance from international operations. Gross margins from service in 1988 were 37.9%, up from 36.8% in 1987 and 37.3% in 1986.

In 1989, revenues from services declined slightly, down to \$1,029.7 million for the first six months, compared to \$1,040.3 million for the same period in 1988. Overall, NCR's 1989 revenues were flat for the first nine months, profits down by 9%, and earnings per share were 1.5% lower.

Service Demographics

NCR's total U.S. service revenue is about \$950 million, of which slightly more than 80% is derived from hardware maintenance. The company has about 21,000 employees in its service operations in over 1,000 locations worldwide, of which 16,500 are field personnel responsible for hardware or software support. U.S. service employment is estimated at approximately 6,000 field repair personnel, operating from 425 different service locations and 20 repair or exchange centers.

The major parts distribution facility is located in Peachtree City, GA, and other depots are located in Oiso, Japan; Schipol, Holland; Augsburg, Germany; and Dundee, Scotland. Parts distribution, repair, acquisition and disposition anywhere within the U.S. is managed by the Peachtree City Worldwide Service Parts Center (WSPC).

NCR is believed to generate approximately \$40 to \$50 million in third-party maintenance revenues, not necessarily directly related to any NCR product line or market segment.

Effective January 1, 1990, U.S. sales and service operations are being reorganized away from the fully vertical integration by line-of-business approach that NCR put in place during the 1970s. Seven U.S. geographic field sales and support divisions are being formed, each of which is expected to act as an autonomous business unit with its own specialized sales and support staff in the field. According to NCR, the reorganization is intended to provide more timely decision making, and to further empower people at the local level to deliver products and services which will give customers a leading edge in the 1990s.

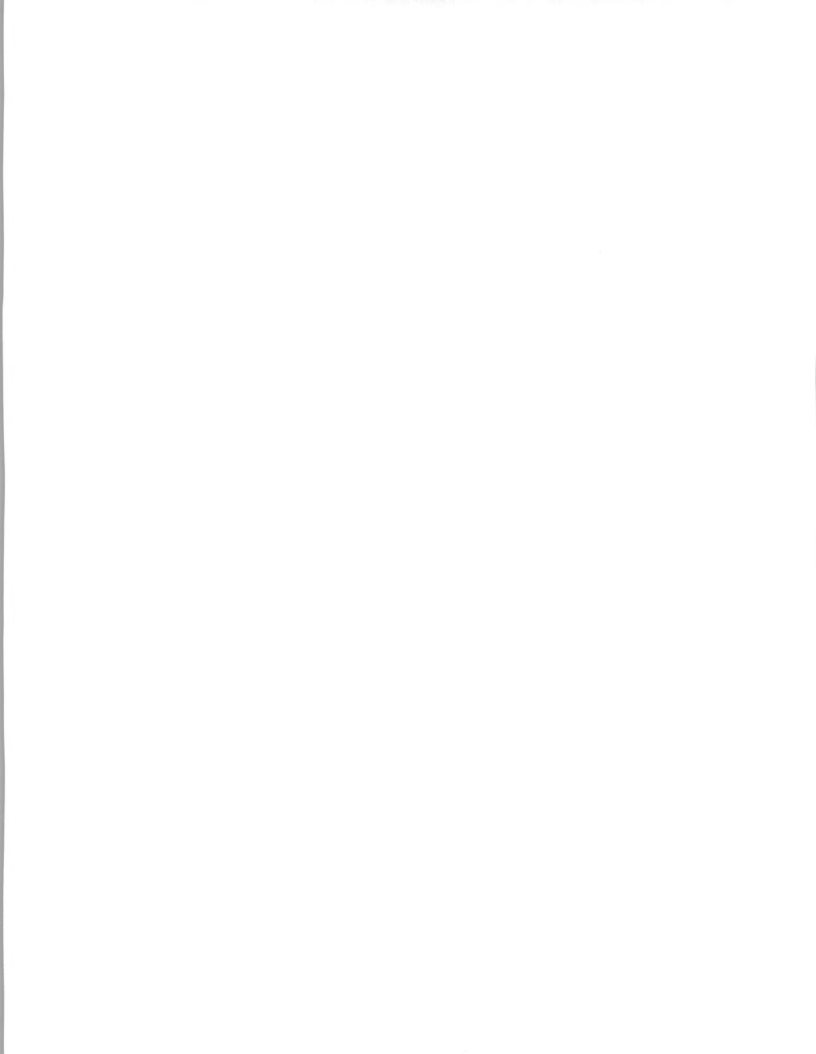
NCR Comten, a wholly owned subsidiary specializing in front-end communications and network processing systems, has more than 100 sales and service facilities located throughout the U.S. and Canada, which operate independently from NCR's other sales and service operations.

Service Delivery

Although a great variety of "standard" service offerings is available in NCR's catalog, NCR proposes to analyze the customer's organizational and operation structure, obtain system configuration and use patterns, and then draw from its range of maintenance options to tailor service solutions based on how the customer's organization actually functions.

Services offered include: on-site or depot repair service, full parts and labor or labor only, cluster on-site service, dedicated on-site CEs, single-source service on non-NCR equipment from major manufacturers, shared service programs, equipment installation and deinstallation, relocation, upgrades and engineering modifications, remote diagnostics and resolution, preventive maintenance, professional account management, and flexible hours of coverage up to 24 hours per day, 7 days per week. NCR offers guaranteed response times of either two or four hours, depending upon product line, and will also guarantee system availability as part of a customized service solution.

NCR will also provide site services, including planning, preparation and power conditioning; network services, including consultation, configuration, installation and verification; disaster backup and recovery assistance; business equipment and media supplies; and comprehensive helpdesk programs including implementation support, assessment, consultations, and software.



The company uses a national central dispatch system and provides performance reporting which covers CE and equipment performance. Over 25,000 customers are surveyed quarterly to determine if needs are being met in a manner acceptable to the customer and NCR.

Over 70 different manufacturers are included in non-NCR products supported under NCR's Single Source Service program. NCR also sells power conditioning products such as transient suppressors, voltage regulators, standby power modules and uninterruptible power supplies, as part of its program to combat power disturbances which may interfere with equipment operation.

NCR's Network Products and Maintenance program includes consultation services for both LAN and WAN networks and hardware products, including network configuration, installation, verification and maintenance. NCR CSD supports Starlan, Token Ring and Ethernet, X.25, T1, and fiber optic products; Bell Operating Company interfaces; analog modems and multiplexers; line drivers, converters and bridges; and software for network design, performance and modeling.

Strategic Commentary

NCR still seems to be highly dependent upon a hardware maintenance theme for most of its service business, although software and total systems approaches are being discussed and marketed. In February 1989, for example, it was reported that NCR's SI group, located in San Diego, CA, was still awaiting its first outside customer client. The 14-person group has concentrated on working with NCR's other sales divisions.

At the corporate level, NCR has organized its software support and systems engineering services within an overall Customer Services umbrella; at the local level, however, hardware maintenance and software/systems engineering groups remain at peer reporting levels. Whether this will result in a competitive disadvantage vis-à-vis programs from companies such as Hewlett-Packard and DEC remains to be seen.

NCR CSD performs maintenance on satellite earth stations and self-service automated video vending equipment, and sells and services data networking equipment, including T1 multiplexers and X.25 packet network switchers made by Case/Datatel, under an agreement signed late in 1989.

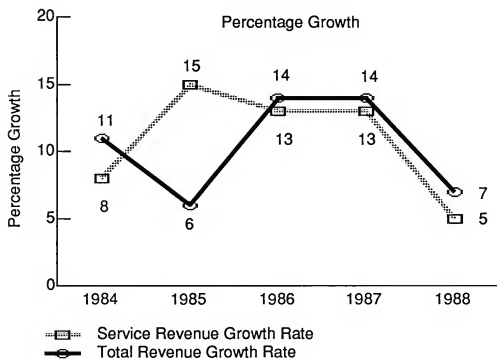
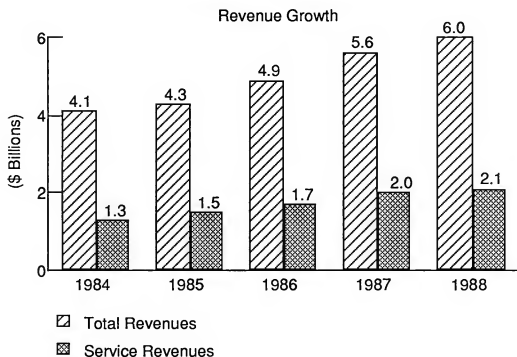
In May 1989, NCR took over the \$15 million (three-year value) national service of XScribe-designed and manufactured computer-aided transcription systems and its base of 8,500 end users.

Late in 1988, NCR sold its rapidly-growing \$10 million ATM services business (providing cash replenishment and first line maintenance) to Wells Fargo Armored Service Corporation.

Gary Burnett, Vice President of the U.S. Customer Services Division, has stated that CSD's mission is to keep current customers satisfied, regain lost customers, make product sales that relate to service performance, and gain new non-NCR maintenance business.



EXHIBIT II-6

**NCR Total Company and
Service Revenue Growth**

COMPANY PROFILE

UNISYS CORPORATION

P.O. Box 500
Blue Bell, PA 19524-0001
(215) 542-3000

W. Michael Blumenthal, Chairman and CEO
George R. Gazervitz, President, Customer
Services & Support Division, USIS
Total Employees: 93,000
Total 1988 Revenue: \$9,902 million
Total 1988 Service Revenue: \$1,971.6 million*

* Equipment maintenance, spare parts and
other repair activities

The Company

Unisys was formed in 1986, when Burroughs Corporation acquired Sperry Corporation. At the end of 1988, Unisys ranked as the fifth-largest information technology company worldwide, and aspires to double its revenues within the next five years.

In January 1988, Unisys acquired Timeplex, Inc., a leading worldwide supplier of wide-area voice and data communications networks. Timeplex will form the cornerstone of Unisys Networks, a vehicle for building enterprisewide voice, data and image networks. In December 1988, Unisys acquired Convergent, Inc., a leader in distributed and networked microcomputer solutions, and a major supplier of products to Unisys from a much earlier OEM relationship between Convergent Technologies (CT) and Burroughs during CT's formative period. Convergent has been combined with existing Unisys microcomputer operations to form the Network Computing Group, which will provide open systems platforms and local area networks for distributed processing solutions. Network Computing was headed until later in 1989 by Paul C. Ely, Jr., formerly Chairman and CEO of Convergent.

Software and related services, which are not included in the maintenance revenue shown above, account for 17% (\$1,672.4 million) of Unisys' 1988 total revenue, compared to \$1,589.9 million in 1987 and \$573.9 million in 1986. Equipment maintenance revenue decreased slightly during 1988, due to increased downward market pressure on prices. Gross margins eroded two points from 1987 to 1988 due to field engineering operations, according to the company.

Unisys has organized around major markets, which are primarily industrial and commercial (manufacturing, distribution, retail and petroleum) and financial (banks, thrifts, securities firms, insurance companies and financial services), and which include communications companies and airlines, federal government agency information services and systems, state and local government, and the defense industry. In October 1989,



additional consolidation of U.S. marketing line-of-business units was announced; the reorganized groups are Commercial Systems, Financial Systems and Government Systems Division(s). INPUT believes that Customer Service and Support, with responsibility for hardware and software support services, will continue as a fourth major division under U.S. Information Systems, the main marketing unit in this country.

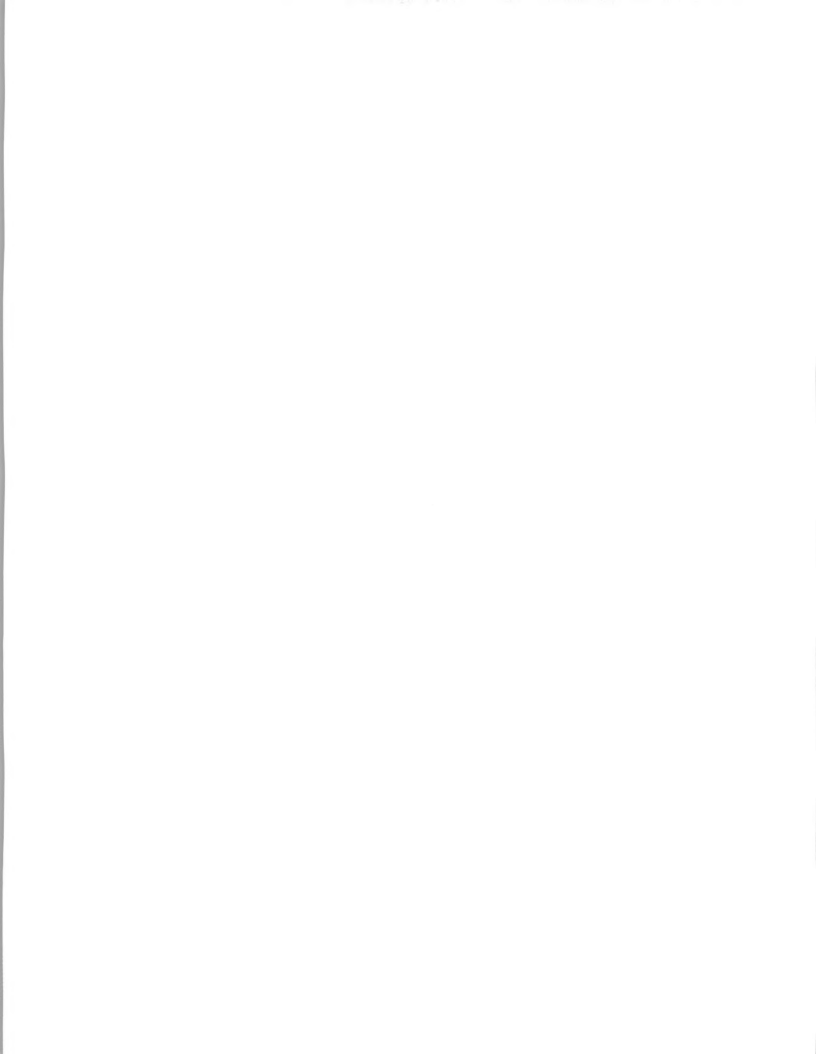
Approximately 54% of total 1988 revenues were derived from U.S. operations.

Net income for 1988 was up 18% over 1987, and fully diluted earnings per share were up 12%. Early in 1989, however, the company projected a weak first quarter due to delays in shipment of its new 2200 series mainframes, and actual financial results during 1989 were more disappointing than anticipated. First quarter 1989 revenue was ahead only 1% from 1988, and Unisys experienced a minor loss; second quarter revenue was also flat, with modest profitability. Third quarter revenue was ahead of 1987 by only 3.7%, and Unisys announced a \$648 million loss for the quarter, much of which was attributed to one-time charges for reduction in force and a write-down due to losses on fixed-price government contracts.

Beyond the special charges for the quarter, it is clear that Unisys is experiencing the same pressure on prices and margins as are other major information technology firms. The headcount is being trimmed to near 80,000 as the result of a year-long hiring freeze, disposition of selected manufacturing facilities, and a general 8,000-person reduction in forces. Not impacting customer service during these cutbacks is a high priority, according to Vice Chairman Curtis A. Hessler.

Unisys is a founding member of the Corporation for Open Systems and is active in other standards-setting groups including the International Standards Organization (ISO) and X/Open. In 1988, the company expanded support of Open Architecture Interconnection (OSI) by adding OSI features to many products, and plans to upgrade all products to full OSI compliance. Unisys also supports UNIX International, a group advocating a standard based on UNIX System V.

Unisys also professes to be a leader in the development and implementation of fourth generation languages (4GLs) which automate many programming functions, allowing customers to develop software much faster than do conventional techniques.



Service Demographics

INPUT estimated that at 1988 year-end, Unisys employed approximately 18,400 personnel in the equipment maintenance segment of its business worldwide. Overall, more than 20,000 employees were involved in equipment maintenance, software customization, consulting services and education services at that time. By the end of 1989, the equipment maintenance headcount was closer to 15,600 and the total for the broader category probably closer to 17,000. The total U.S. customer service and support headcount is judged to be 9,000.

Unisys maintains a field service presence in approximately 300 U.S. cities, and has primary offices in approximately 60 major cities which provide depot (ship-in or carry-in) repair, logistics support, and field technical and management assistance.

Spare parts are centrally stocked, distributed and managed in the U.S. from Unisys' Worldwide Distribution Center, located near Chicago, and from approximately 16 field support banks (FSBs) which support Unisys 2200 series mainframes and peripherals. FSBs are located close to major metropolitan airports and are staffed 24 hours a day, 7 days a week to assure delivery of service parts anywhere in the U.S. in 4 hours or less.

Unisys operates six Customer Support Centers in the U.S., which concentrate on providing central support for software, as well as remote diagnostics and service call dispatch for Unisys mainframes.

Unisys' service facilities in the U.S. were augmented in 1988 with implementation of a 10,000 square foot configuration center in Lombard, IL. The center concentrates on assembling, testing, integrating, storing and shipping Unisys' own or multivendor workstation products for major nationwide accounts. The objective of the facility is to minimize installation time and eliminate problems associated with customized configurations of workstation or personal computer products.

Service Delivery

Unisys offers a broad range of services, including hardware maintenance, software support, operations training, installation/relocation service, conversions, upgrade and professional services. Previously referred to as CUSTOMCARE*, a new approach called SURETY was introduced on a limited basis in April 1989.

SURETY is a complete hardware and software support approach packaged at four distinct levels—Intro, Basic, BasicPlus and Comprehensive. The Intro offer is aimed at accounts where price is a primary consideration; the Basic level attempts to balance price with flexibility; BasicPlus is expected to be considered where system dependency is a high priority; and Comprehensive is a package with guaranteed service levels aimed at the UNIX and mainframe segment of Unisys' business.



Intro makes telephone support available with a 1-900 call, and provides essential engineering changes, software and hardware maintenance at preferred time-and-materials rates. Basic level is aimed at carry-in or ship-in products or accounts and includes preferred pricing on supplies and education from Unisys, in addition to Intro service. BasicPlus is traditional repair, preventive maintenance and reliability modifications for hardware during normal 8-to-5, Monday-through-Friday business hours; software maintenance releases, preferred pricing for Unisys' supplies, education and environmental products; and is available by calling a toll-free telephone number.

Comprehensive service provides coverage, including installation of even customer-installable devices, during all of the customer's operating hours (24 hours per day, 7 days per week if necessary), with guaranteed response times for hardware on-site service as well as software support telephone assistance. Guaranteed on-site hardware repair response is 1.5 hours within a 30-mile radius of the nearest service office during the principal period of maintenance, and 2.5 hours after normal business hours; response time measurements exclude remote diagnostic time. Guaranteed telephone access during the principal period of maintenance for software is 20 minutes, which Unisys suggests will be achieved by prioritizing inbound calls for software support.

Unisys also suggests that completely customized service programs can be arranged through special negotiations.

SURETY provides an annual price protection cap of 5%. Discounts are available for multiple machines at a site.

The program is expected to be extended to the 2200 series of mainframes during the first half of 1990.

Strategic Commentary

As do many other large and midrange system vendors, Unisys distributes many of its entry-level and low-end products through VARs and Master Distributors. The program is worthy of mention in this service assessment because VAR commentary about service and support might be indicative of service performance as a whole. Unisys has made a number of efforts to improve service to VARs during the three years since the "power of 2" phrase was initiated, but reaction from the reseller community remains mixed. In recent reports, VARs raised many of their ratings of Unisys' performance, but channel conflict remains a serious issue.

Unisys has enhanced its royalty program for VARs, paying them an ongoing incentive of 9% of the value of Unisys-provided end-user hardware and software support contracts. Unisys has also been testing a free on-site maintenance program as part of its VAR offerings. Unisys' SURETY service program is available for the reseller channel, but the reseller lacks the flexibility available in IBM's discount programs.

Unisys is merging its systems integration projects, which generated about \$160 million in 1988, with its recently reorganized USIS organization; previously, the Complex Systems Integration (CSI) division had been a more freestanding business unit. Key Unisys officers have pledged to put more emphasis on SI, and Unisys' commitment to OSI is consistent with this thrust.

In 1986, Unisys made a serious attempt to establish a third-party maintenance sales and support program, but this program has recently been de-emphasized; sources indicate that portions of the third-party business acquired while the program was active have been quietly offered for sale to other companies.

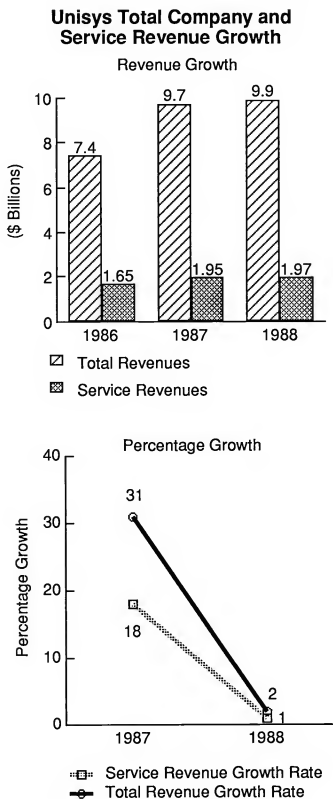
For its 2200 series, Unisys offers a competitive service program—a customer's first call is to the CSC, which analyzes the problem using remote diagnostics, and immediately directs shipment of a replacement part along with notification to the CE; if the CE is already on-site, the CE will contact the CSC for parts dispatch. CSCs also offer a state-of-the-art support program for software.

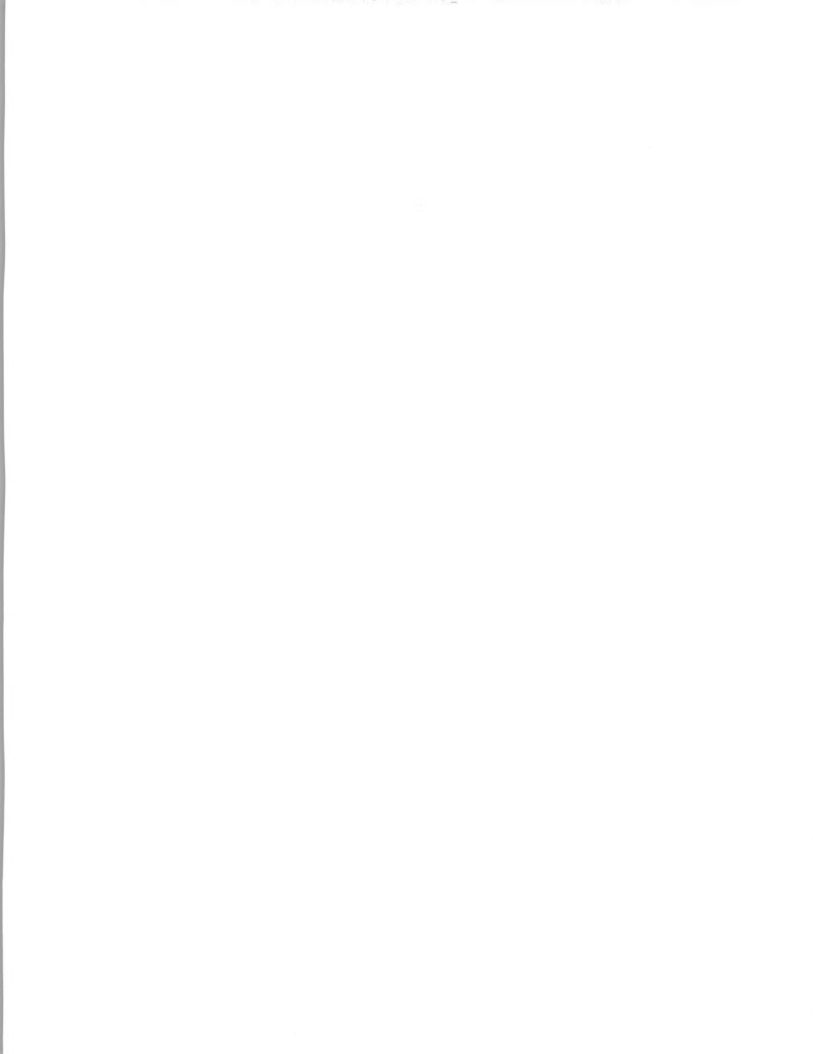
However, none of Unisys' programs for service have been characterized by the bold strokes which IBM has made this past year, nor has the company continued to aggressively expand its service business as NCR has attempted. The only unique program INPUT can identify is the configuration center in Lombard, IL.

Unisys seems preoccupied with other matters, preferring to make slower, steady progress toward enhancing its service programs.



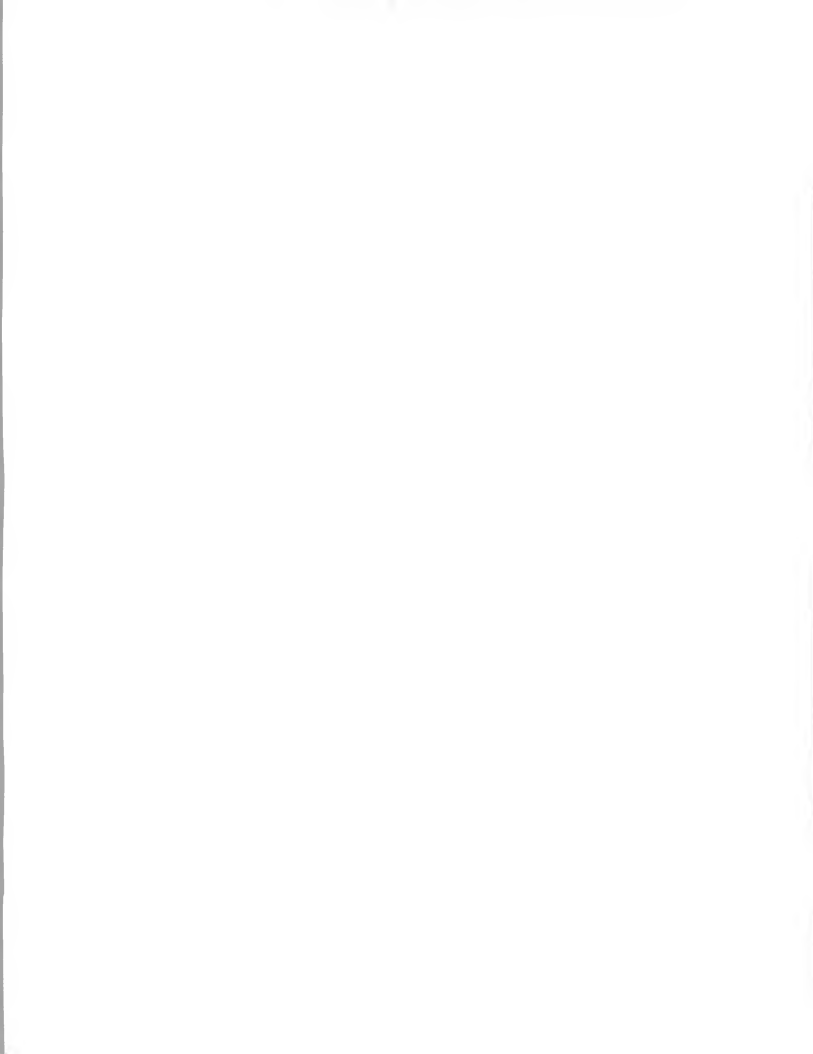
EXHIBIT II-7







Large-Systems Service Vendor Comparative Tables





Large-Systems Service Vendor Comparative Tables

EXHIBIT III-1

Large-System Vendor Revenue Analysis

Company	Total Company Revenues (\$ Millions)	Percent Growth 1987-1988	Service Revenue (\$ Millions)	Percent Growth 1987-1988
Amdahl	1,801	19.7	334	23.2
CDC	3,628	-1.1	412	3.0
Bull HN	2,200	6.8	640	24.3
IBM	59,681	10.1	7,347	-4.5
Hitachi	900	28.6	121	26.0
NCR	5,990	6.2	2,097	7.4
Unisys	9,902	1.9	1,972	0.1

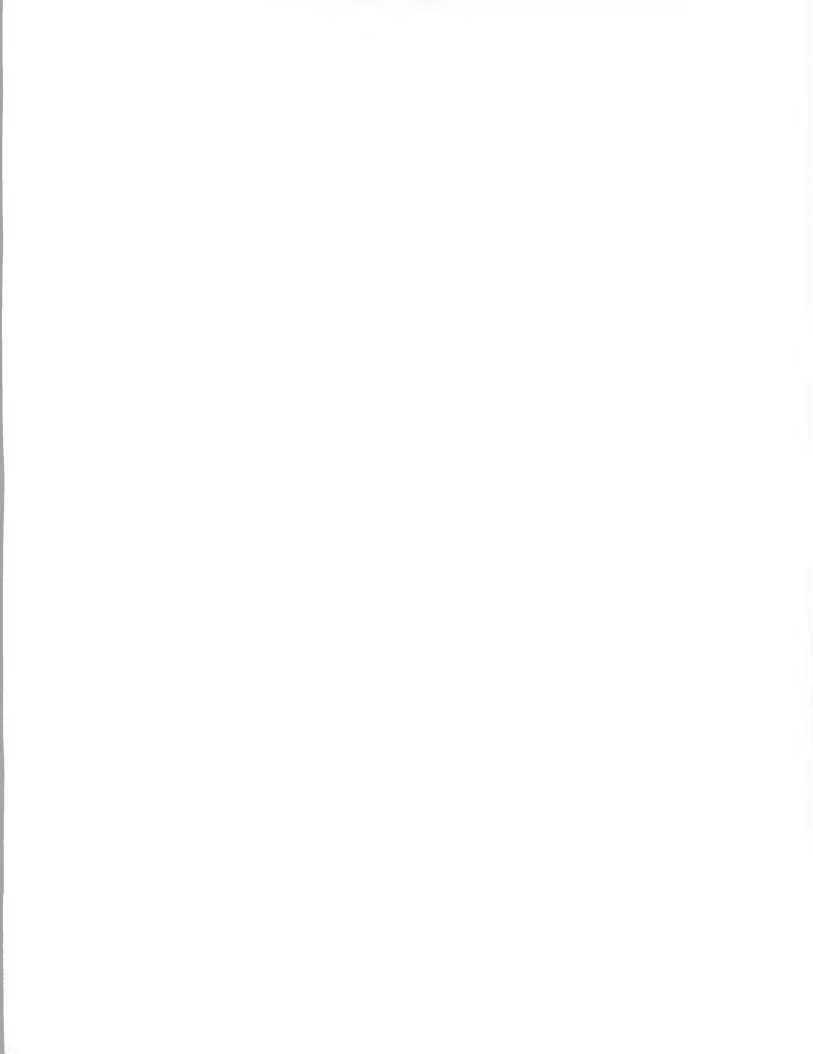


EXHIBIT III-2

**Large-System Vendor Service
Revenue Analysis**

Company	Total Service Revenues (\$ Millions)	Total Service Employees (U.S. only)	Total FEs
Amdahl	334	1,025	410 †
CDC	412 †	3,600 †	*
Bull HN	640 †	2,300	*
IBM	7,347	27,000	17,000
Hitachi	121	560 †	250 †
NCR	2,097	11,500 †	6,000 †
Unisys	1,972	9,000 †	5,850 †

Note: All revenue figures are consolidated

* Company did not respond

† INPUT estimate

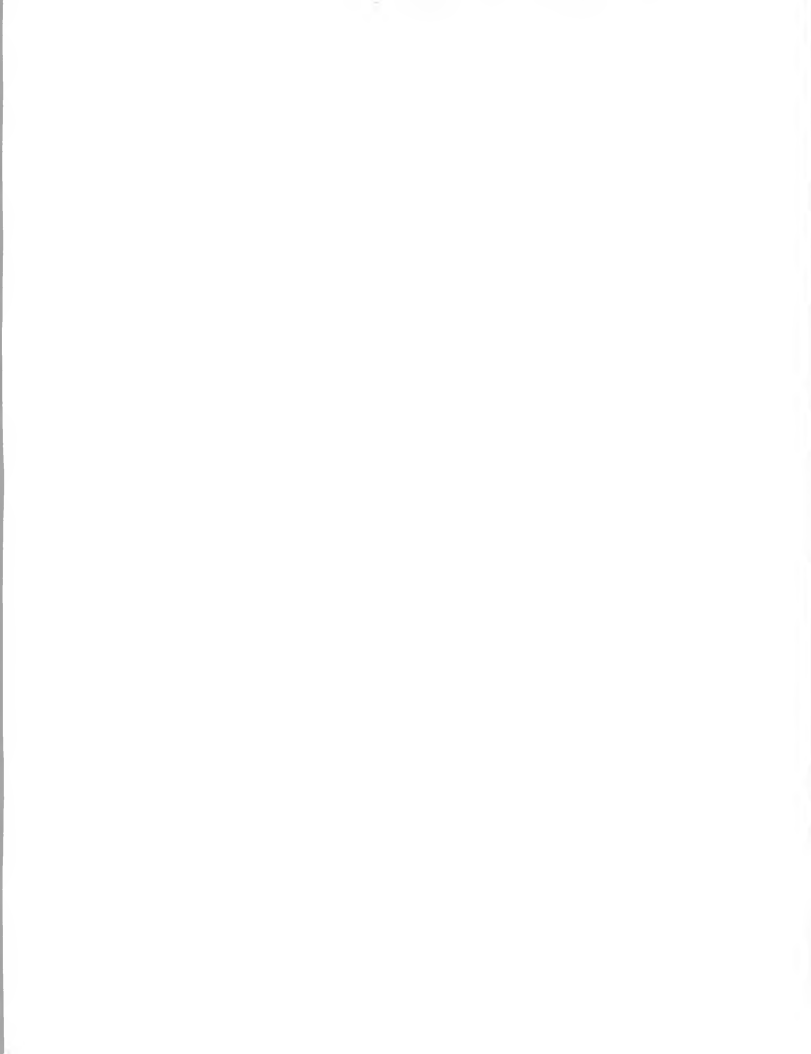


EXHIBIT III-3

Large-System Vendor Contract Coverage

Company	Standard Coverage (Hours/Days)			
	24/7	24/5	9/5	11/5
Amdahl	X			
CDC				X
Bull HN			X	
IBM	X			
Hitachi	X			
NCR			X	
Unisys			X	

EXHIBIT III-4

Large-System Vendor Service Exclusions

Company	Billable Exclusions				
	Customer Error	Product Not Under Contract	Software Problem	Alter./ Attach.	Act of God
Amdahl				X	X
CDC		X		X	X
Bull HN	*	*	*	*	*
IBM		X		X	*
Hitachi	X	X		X	X
NCR	X	X	X	X	X
Unisys			X		

* Company did not respond

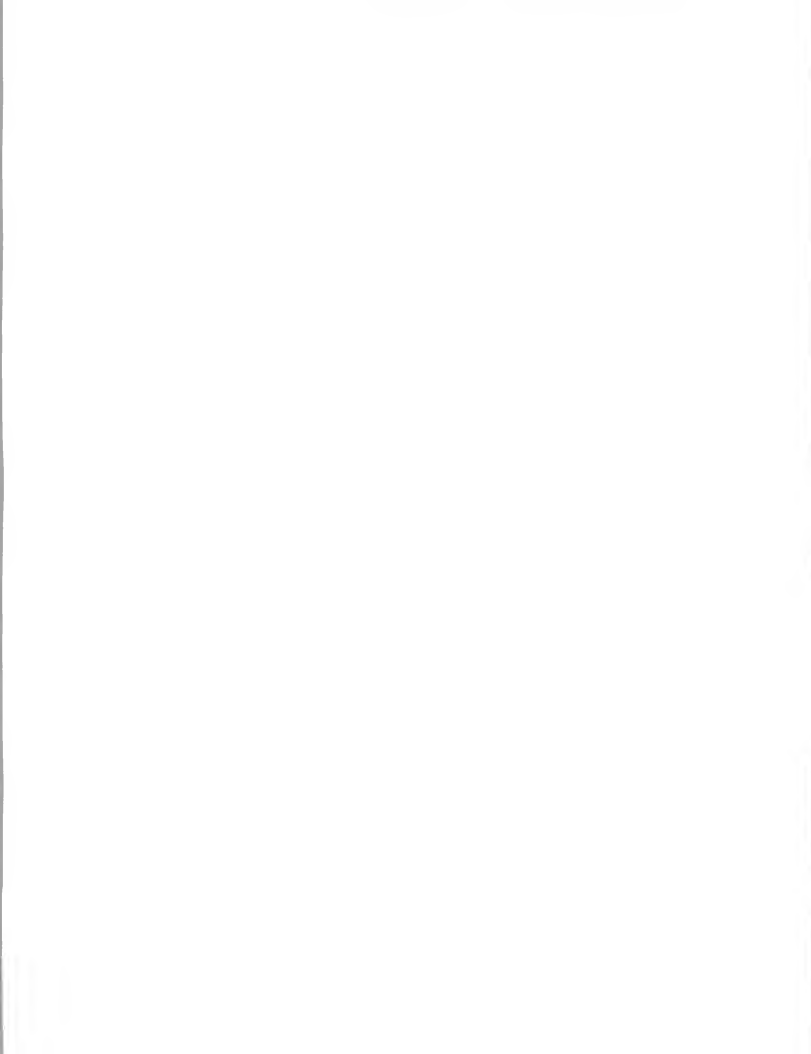


EXHIBIT III-5

Large-System Vendor Hourly Rate

Company	M-F 8 a.m. - 5 p.m.	M-F After 5 p.m.	Saturday	Sunday & Holidays
Amdahl	\$270	\$310	\$310	\$310
CDC	180	180	180	180
Bull HN	175	210	210	210
IBM	262	262	262	262
Hitachi	265	310	310	310
NCR	175	227	227	227
Unisys	175	195	195	195

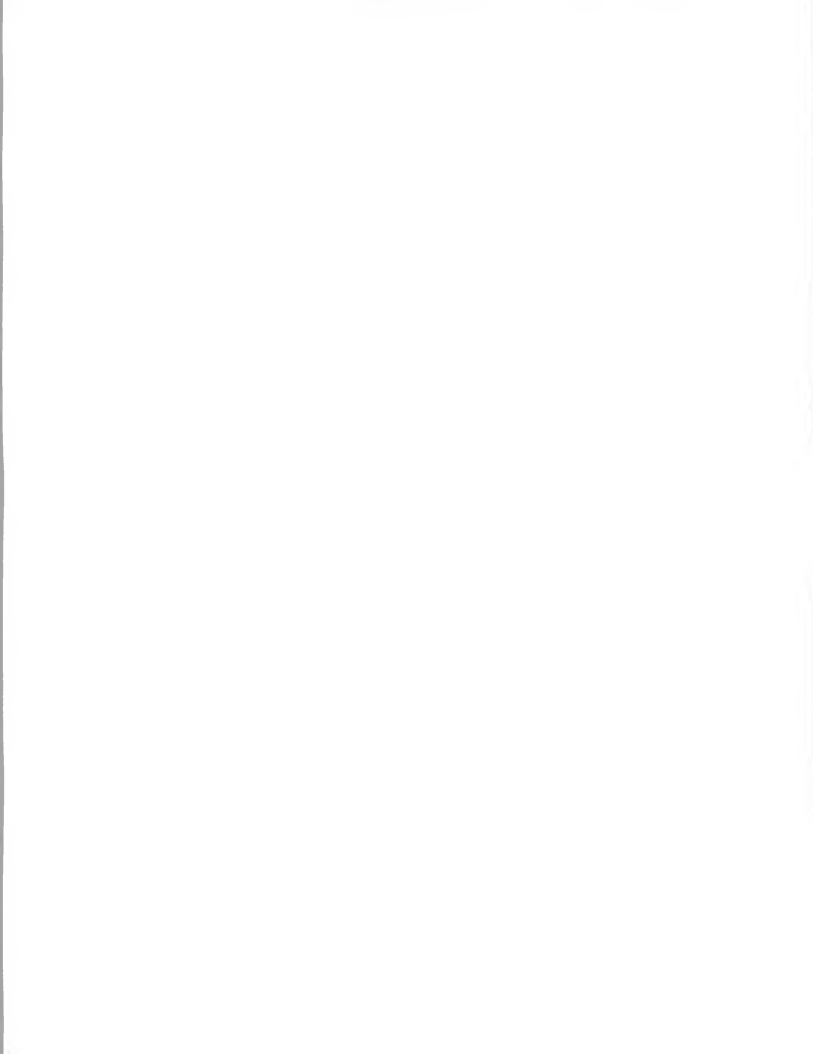


EXHIBIT III-6

Large-System Vendor Discounts Multiyear and Prepay

Company	Discounts Available					
	Multiyear			Prepayment		
	1st Yr.	2nd Yr.	3rd Yr.	1st Yr.	2nd Yr.	3rd Yr.
Amdahl	*	*	*	*	*	*
CDC	X	X	X	X	X	X
Bull HN	X	X	X			
IBM	X	X	X	X	X	X
Hitachi	*	*	*	*	*	*
NCR	X	X	X	X	X	X
Unisys	X	X	X	X	X	X

X Provides discount

* Company did not respond; stated that contracts and prices are tailored to individual customer needs



EXHIBIT III-7

Large-System Vendor—Other Discounts Offered

Company	Other Discounts					
	Carry-In	Call Screens	Dollar Volume	Unit Volume	Remote Support	Deferred Response
Amdahl	*	*	*	*	*	*
CDC				X		X
Bull HN	X		X	X		
IBM						X
Hitachi	*	*	*	*	*	*
NCR	X	X	X	X	X	X
Unisys	X	X	X	X	X	X

X Provides discount

* Company did not respond; stated that contracts and prices are tailored to individual customer needs

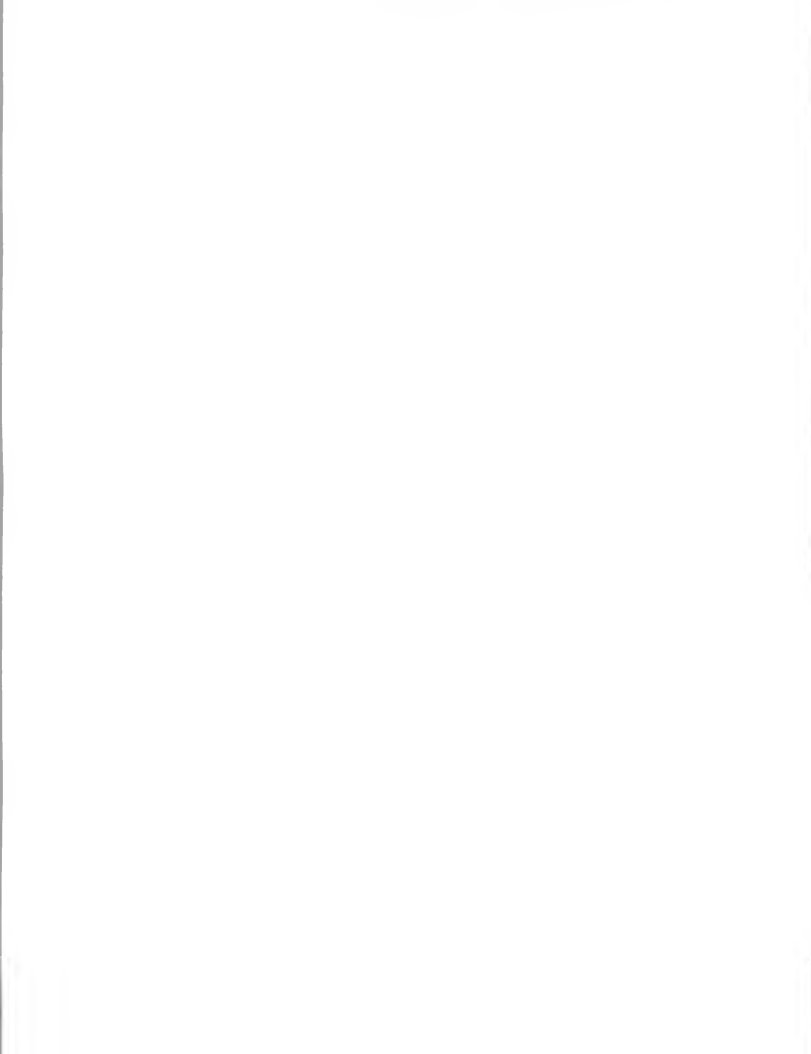


EXHIBIT III-8

Large-System Vendor Software Support

Company	Software Support				
	How Performed			How Charged	
	On-Site	Remote	Both	Bundled	Hourly (H) or Monthly (M)
Amdahl			X	X	
CDC			X		H/M
Bull HN			X		M
IBM			X	X	
Hitachi			X		H/M
NCR			X		H/M
Unisys †			X	X	H/M

† Some unbundled support; annual support fee when unbundled



EXHIBIT III-9

Large-System Vendor Software Support Discounts

Company	Software Support Discounts			
	Multi-Copies	Call Screen	Prepay	Multi-year
Amdahl	X		X	
CDC	X		X	
Bull HN	X			X
IBM				
Hitachi	*	*	*	*
NCR		X		
Unisys	X			

X Provides discount

* Company did not respond; stated that contracts and prices are tailored to individual customer needs

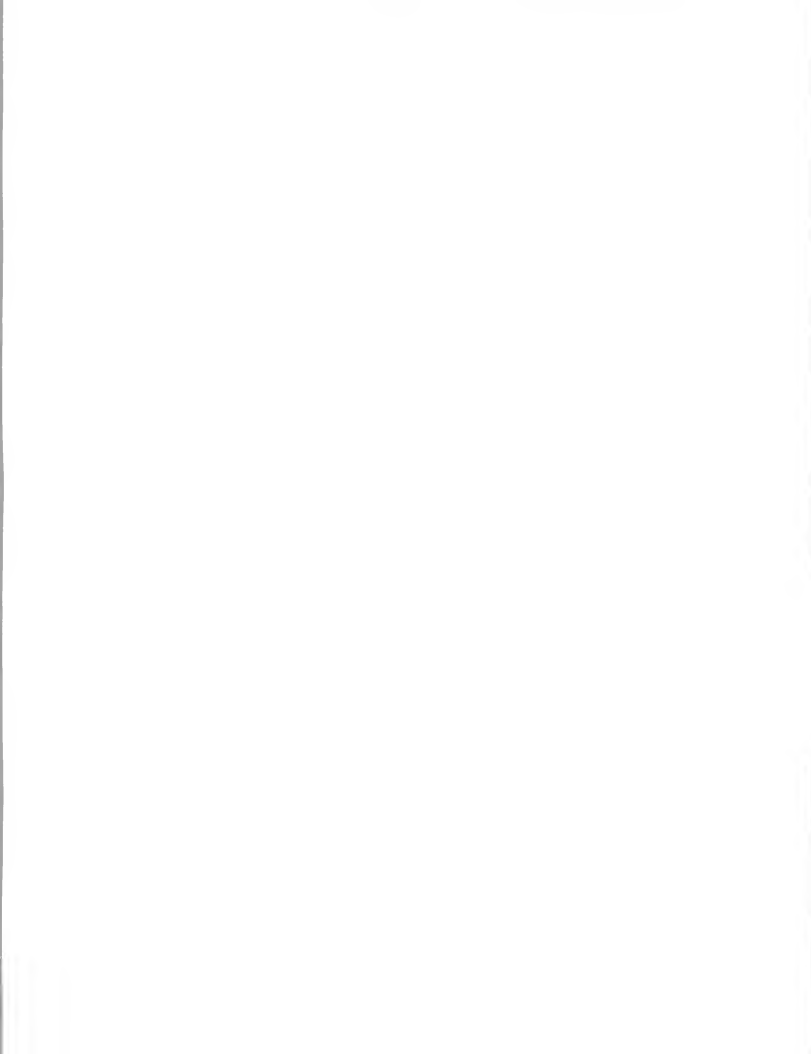


EXHIBIT III-10

**Large-System Vendor Support Provided
for Other Equipment**

Company	Support Other Manufacturer's Products				
	Peripherals	Workstations/ Micro- computers	Midrange Systems	Large Systems	Software
Amdahl	X				X
CDC	X	X	X	X	X
Bull HN	X	X			
IBM	X	X	X	X	X
Hitachi	X		X	X	X
NCR	X	X			
Unisys	X	X			X

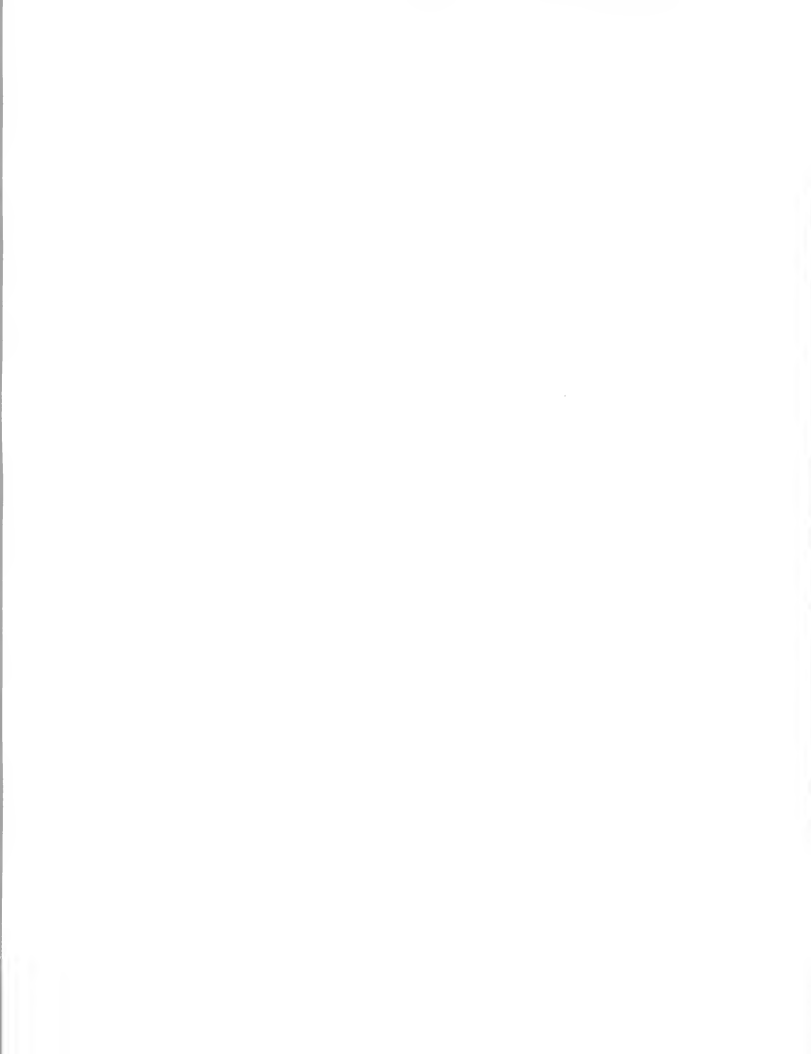
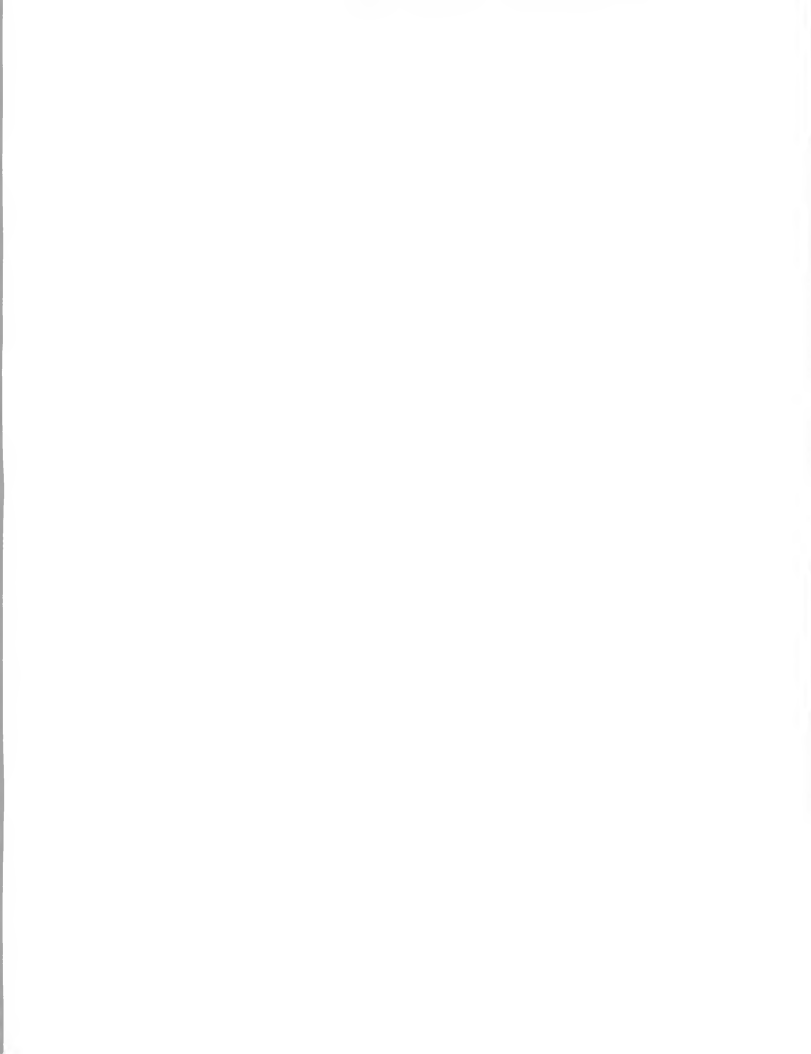


EXHIBIT III-11

Large-System Vendor Support Provided to TPM

Company	Support Provided to TPMs							
	Local Access to Parts	Central Access to Parts Only	Maintenance Documentation	Engineer Change Orders	Tech. Support All Hours	Tech. Support	Training	Software Documentation
Amdahl								
CDC		X	X	X	X		X	X
Bull HN	X	X		X	X		X	
IBM		X	X	X		X	X	X
Hitachi								
NCR								
Unisys		X	X					





Appendix: Questionnaire





Appendix: Questionnaire

INPUT

Customer Service Program Vendor Survey Information

Manufacturer Name _____

TPM Name _____

Address _____

Persons Contacted	NAME	TITLE	PHONE

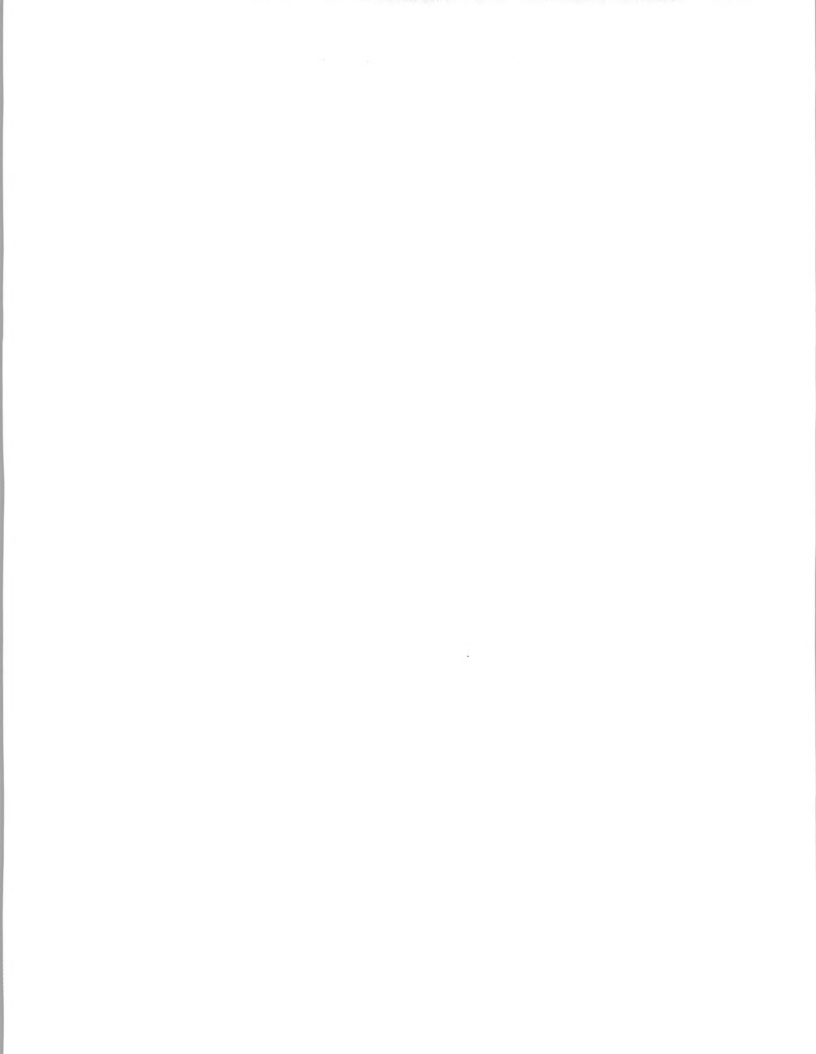
1. Demographics

A. Total # of Service Employees _____
(Field, HQ, Support, etc.)

B. Number of CEs, FEs _____

C. Number of Program Support Reps _____

D. Number of Total Field Personnel _____



- E. Number of Non-Field Personnel _____
- F. Number of U.S. Service Locations _____
- G. Number of U.S. Repair/Exc. Centers _____
- H. Number of Parts Distr. Centers _____

I. What is the geographic coverage of your service?

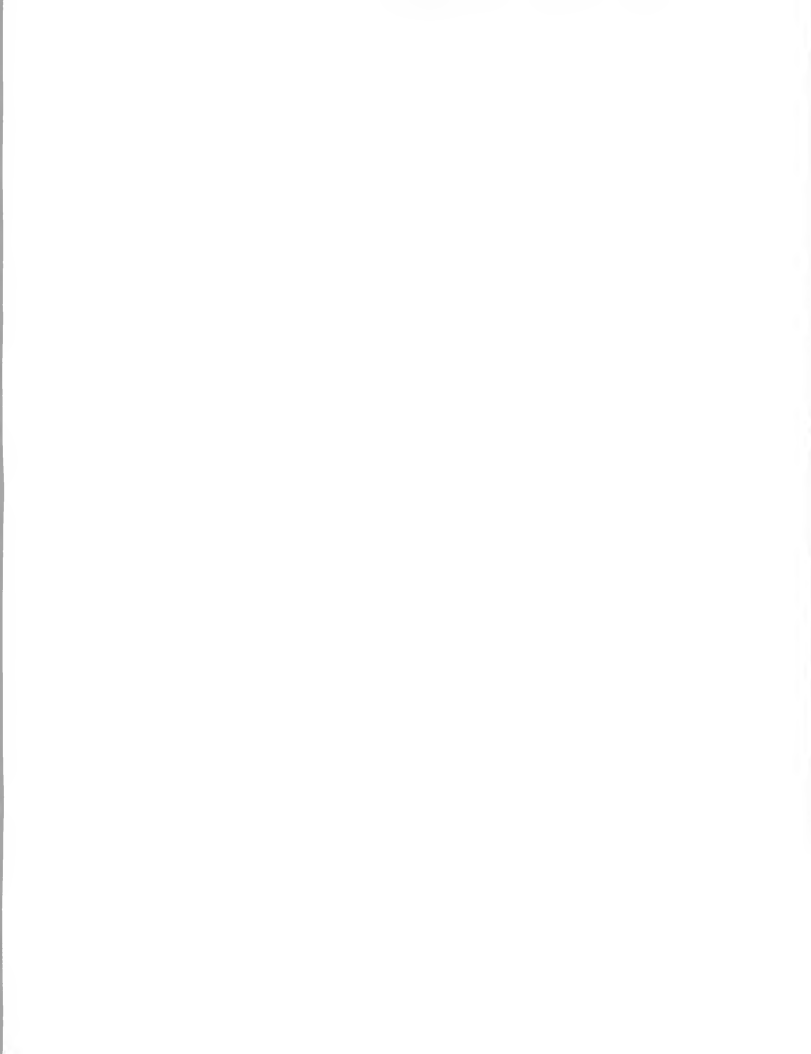
- ☐ NE (ME, VT, NH, NY, MA, CT, RI, PA, NJ, MD, DE, WV, VA)
- ☐ SE (KY, AR, TN, NC, SC, MS, AL, LA, GA, FL)
- ☐ Central (MN, WI, MI, IA, IL, IN, OH, MO)
- ☐ SW (CA, NV, UT, AZ, CO, NM, TX, OK, KS)
- ☐ NW (OR, WA, ID, MT, WY, ND, SD, NE)
- ☐ Noncontinental (AK, HI)

J. Please check the types of products you service:

- ☐ Workstation/PCs
- ☐ Midrange systems
- ☐ Large systems
- ☐ Software

K. Which of the following services do you provide?

- ☐ Manufacturers Warranty
- ☐ Hardware Maintenance
- ☐ Software Maintenance
- ☐ Training for Fee
- ☐ Installation/Relocation
- ☐ Fourth-Party Maintenance
- ☐ Conversion/Upgrade
- ☐ Refurbishment



L. If you are a third party, please list the principal products that you service:

	MANUFACTURER	PRODUCT TYPE	MODEL #(S)
EX:	IBM	TERMINALS	3270
1.	_____	_____	_____
2.	_____	_____	_____
3.	_____	_____	_____
4.	_____	_____	_____
5.	_____	_____	_____
6.	_____	_____	_____

2. Revenue

A. Total Annual Service Revenue _____

B. % of Total Revenue from Software Support _____

C. % of Total Revenue from Professional Support _____

D. % of Total Revenue from Education Fees _____

E. % Growth of Total Revenue Last Year _____

3. Growth Opportunities

Please give us your best estimate of the probable revenue growth rates for each of the following major services:

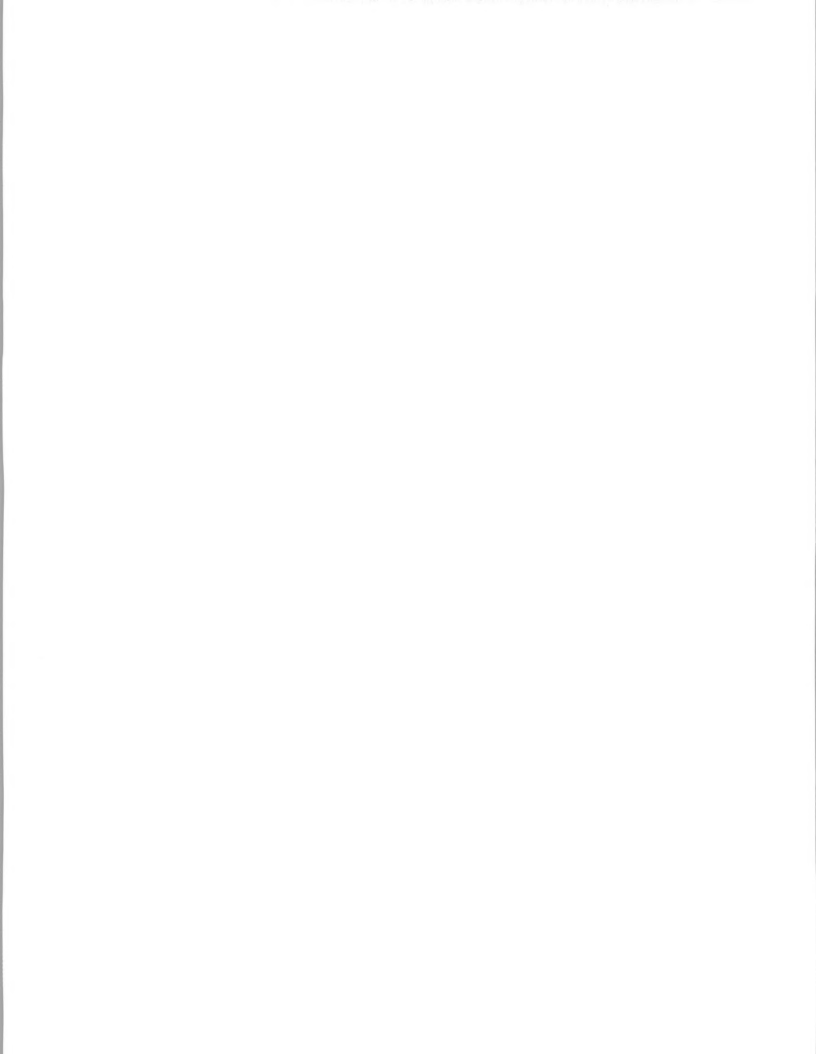
Hardware maintenance _____ %

Third-party maintenance _____ %

Software support _____ %

Professional services _____ %

Education/Training fees _____ %



4. Major Service-Related Problems

A. What do you consider the major service-related problem that your company faces right now? _____

B. What do you see as the major service-related problem in the next 2 to 3 years?

5. Standard/Base On-Site Hardware M/A**A. Hours of Coverage**

24 hrs/ 7 days/week _____

24 hrs/5 days/week _____

9 hrs/5 days/week _____

11 hrs/5 days/week _____

Other (Please Describe) _____

B. Billable Exclusions

Customer Error YES ☐ NO ☐

Product Not Under M/A (PD) YES ☐ NO ☐

Software Problem YES ☐ NO ☐

Alterations/Attach Damage YES ☐ NO ☐

Lightning/Flood Damage YES ☐ NO ☐

C. Response Time

Commitment/Guarantee YES ☐ NO ☐

Objective YES ☐ NO ☐

RESPONSE TIME

Workstation/PC hours _____

Midrange hours _____

Large System hours _____



- D. Travel Time/Expense Exclusions
(i.e., Time & Expense Billable)
- No Exclusions _____
- Over 25 miles from Service Office _____
- Over 50 miles from Service Office _____
- Over 75 miles from Service Office _____

- E. Price Protection YES ☐ NO ☐
- If YES, for how long? _____

- F. Hourly Rates for Exclusions and Outside Hours

	Workstation/PC	Midrange	Large
Business hours M-F	_____	_____	_____
After hours M-F	_____	_____	_____
Saturday	_____	_____	_____
Sunday/Holiday	_____	_____	_____

- G. Discounts Available

	YES	NO	1 YR %	2 YR %	3YR %
Multiyear	<input type="checkbox"/>	<input type="checkbox"/>	_____	_____	_____
Prepay	<input type="checkbox"/>	<input type="checkbox"/>	_____	_____	_____

	YES	NO	%	TO	%
Carry-in	<input type="checkbox"/>	<input type="checkbox"/>	_____	_____	_____
Call Screening	<input type="checkbox"/>	<input type="checkbox"/>	_____	_____	_____
Dollar Volume	<input type="checkbox"/>	<input type="checkbox"/>	_____	_____	_____
Unit Volume	<input type="checkbox"/>	<input type="checkbox"/>	_____	_____	_____
Performance	<input type="checkbox"/>	<input type="checkbox"/>	_____	_____	_____
Deferred Resp.	<input type="checkbox"/>	<input type="checkbox"/>	_____	_____	_____
Remote Support	<input type="checkbox"/>	<input type="checkbox"/>	_____	_____	_____

In addition to the discounts above, do you also negotiate discounts with individual customers?

YES ☐ NO ☐

If YES, what types are usually negotiated?

H. For customers not under contract, what are your standard hourly rates during normal business hours Monday through Friday?

Workstations/PCs _____
Midrange systems _____
Large systems _____
Software support _____

I. Do you have a minimum for hourly service?

1 hours _____
2 hours _____
None _____

J. Sales/Marketing

Please select which of the following best describes how the sales/marketing function is handled in your company:

Product Sales Responsibility _____
Service Responsibility _____
Joint Responsibility _____

IF A SERVICE RESPONSIBILITY,
Are full time sales reps used? _____
Or is it a responsibility of the
service manager? _____

Are incentives provided to the customer engineers to sell service? _____

K. If you are the service organization of a hardware or software vendor, do you support or maintain products not manufactured or marketed by your company?

YES ☐
NO ☐
N/A ☐

If YES please check the categories of products that you support:

Workstations/PCs ☐
Midrange systems ☐
Large systems ☐
Software ☐

L. Software Support

If you are the service organization of a vendor that markets software, do you support it?

YES ☐NO ☐

If YES, what is the nature of this support?

On-site ☐Remote ☐Both ☐

Is this support bundled with the license fee for the software?

YES ☐NO ☐

If NO:

Do you charge a monthly fee for this service or is it only available on an hourly fee basis?

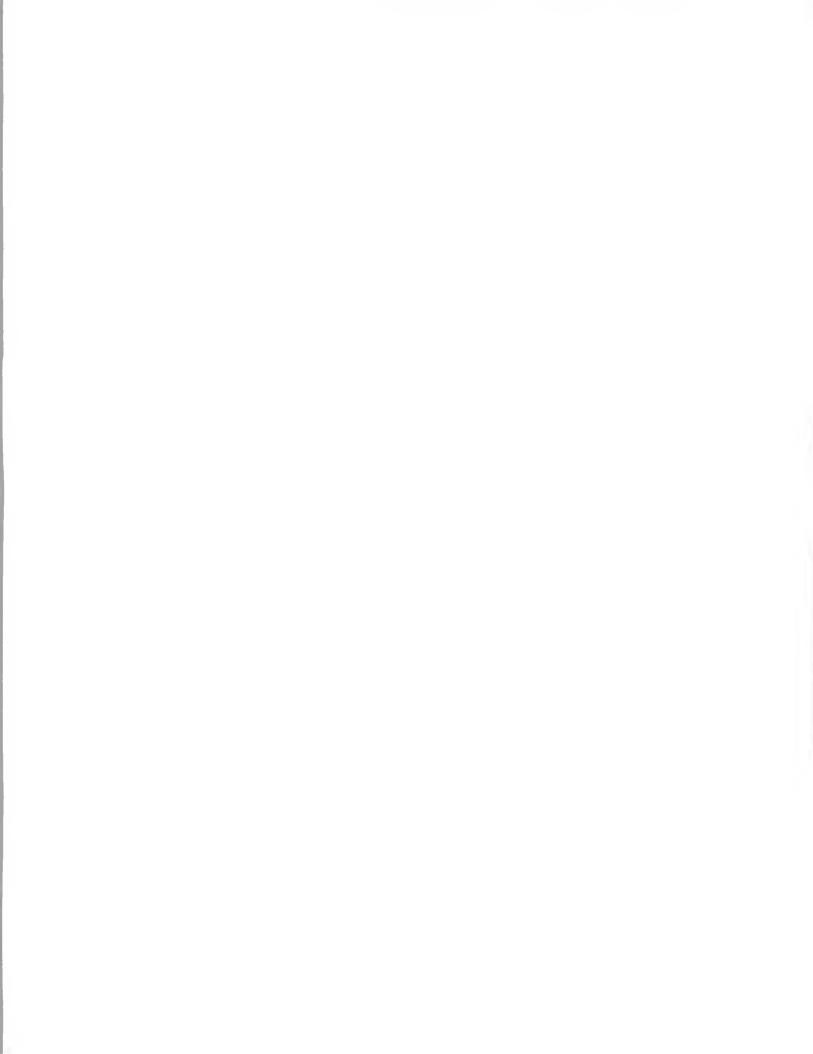
Monthly fee ☐Hourly ☐Both ☐

Do you offer any of the following discounts for software support?

Multiple copies ☐ _____ % TO _____ %Call screening ☐ _____ % TO _____ %Prepayment ☐ _____ % TO _____ %Multiyear ☐ _____ % TO _____ %

If you are a third-party organization, do you offer a software support service?

YES ☐NO ☐



If YES, what is the nature of this support?

- On-site ☐
- Remote ☐
- Both ☐

Do you charge a monthly fee for this service or is it only available on an hourly fee basis?

- Monthly fee ☐
- Hourly fee ☐
- Both ☐

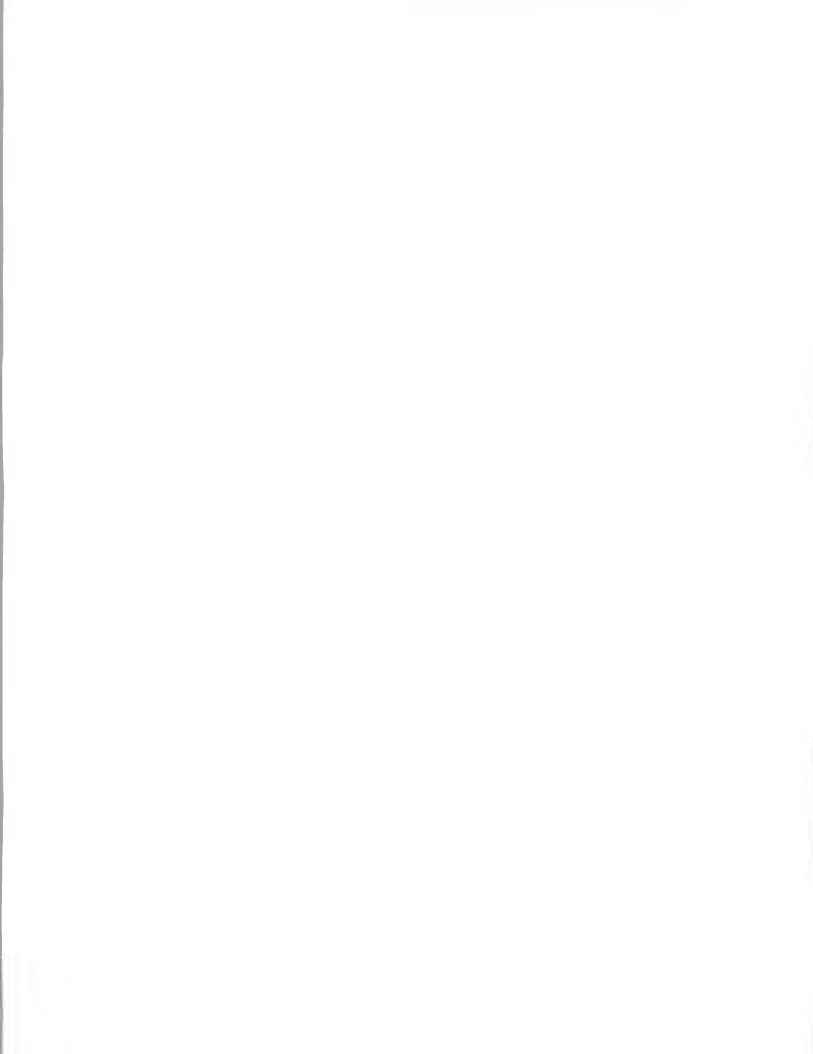
Do you offer any of the following discounts for software support?

- | | | |
|----------------|--------------------------|--------------|
| Multi copies | <input type="checkbox"/> | ___% TO ___% |
| Call screening | <input type="checkbox"/> | ___% TO ___% |
| Prepayment | <input type="checkbox"/> | ___% TO ___% |
| Multiyear | <input type="checkbox"/> | ___% TO ___% |

M. Third-Party Support

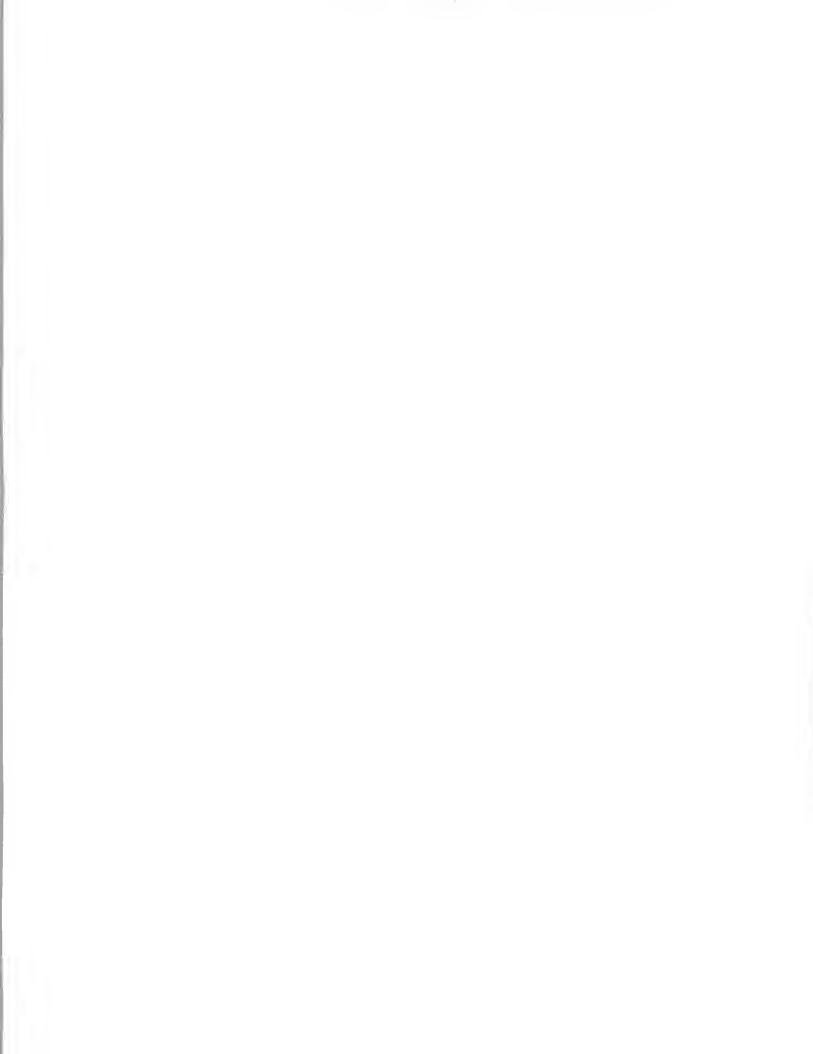
If you are a hardware or software vendor, what types of support do you offer third parties?

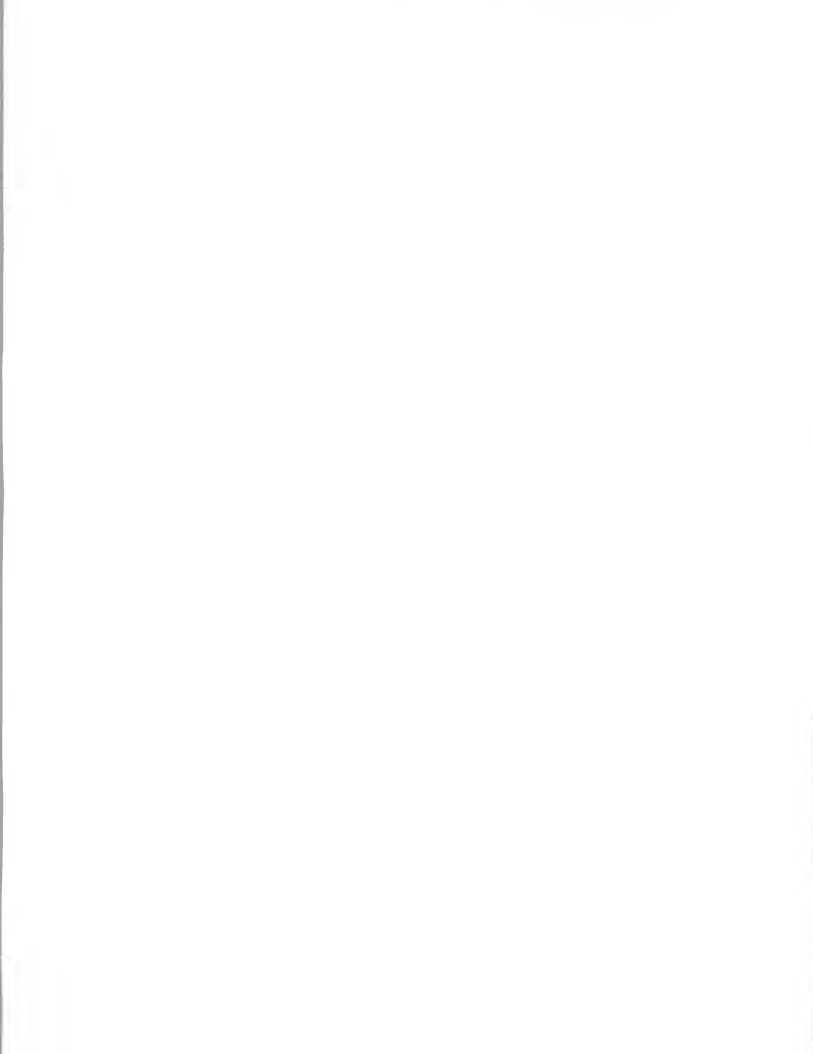
- ☐ Local branch parts availability
- ☐ Parts dist. center availability only
- ☐ Maintenance documentation
- ☐ Software documentation
- ☐ Engineering changes
- ☐ Technical support—all hours
- ☐ Technical support—prime shift (M-F)
- ☐ Training



If you are a third party, which of the above items and from which vendor do you have a significant problem in obtaining?

THANK YOU VERY MUCH FOR PARTICIPATING IN THIS SURVEY!

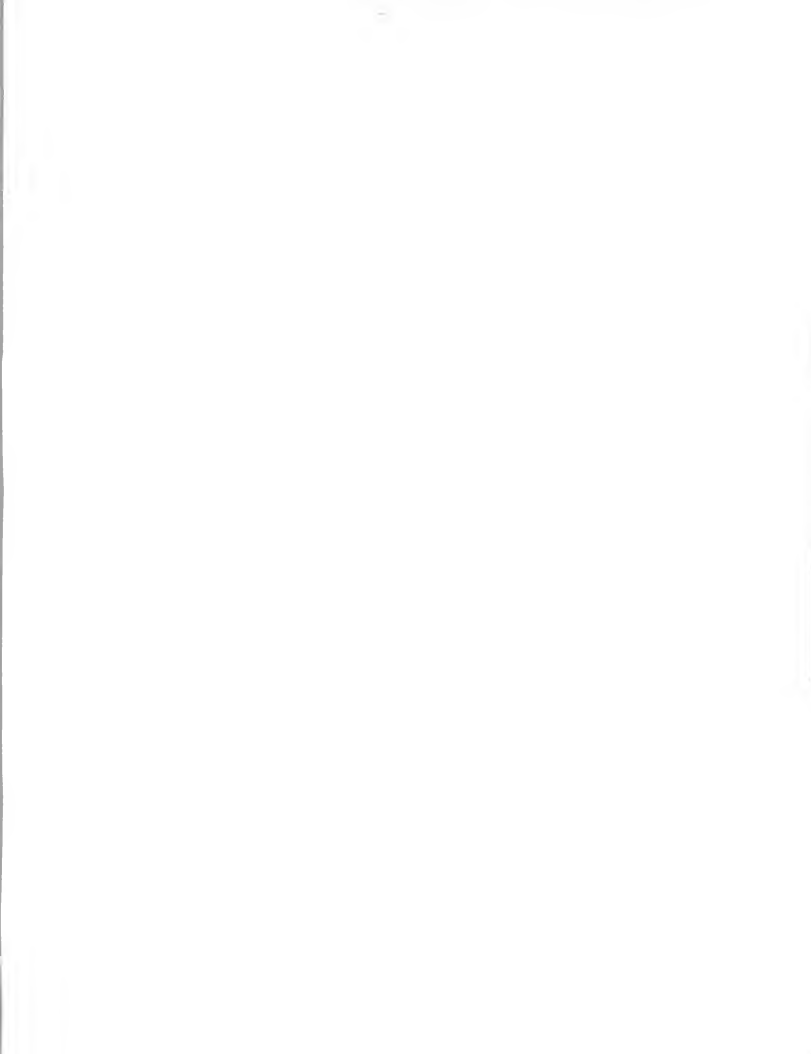






Appendix: Definitions





B

Appendix: Definitions

Applications Software - Software that performs processing to service user functions.

Artificial Intelligence - The academic discipline involving the study of the processes by which humans perceive and assimilate data (and use reasoning to process this data) for the purpose of duplicating these processes within computer systems. Also, this term refers to the computer systems that accomplish these duplicated processes.

BOC - Bell Operating Company.

Consulting - Includes analysis of user requirements and the development of a specific action plan to meet user service and support needs.

Dispatching - The process of allocating service resources to solve a support-related problem.

Divestiture - The action, stemming from antitrust lawsuits by the Department of Justice, which led to the breakup of AT&T and its previously owned local operating companies.

Documentation - All manuals, newsletters, and text designed to serve as reference material for the ongoing operation or repair of hardware or software.

End User - May buy a system from the hardware supplier(s) and do own programming, interfacing, and installation. Alternatively, may buy a turnkey system from a systems house or hardware integrator.

Expert Systems Applications - Applications for expert systems—a computer system based on a data base created by human authorities on a particular subject. The computer system supporting this data base contains software that permits inferences based on inquiries against the



information contained in the data base. Expert systems is often used synonymously with “knowledge-based systems,” although this latter term is considered to be broader and to include expert systems within its scope.

Engineering Change Notice (ECN) - Product changes to improve the product after it has been released to production.

Engineering Change Order (ECO) - The follow-up to ECNs that include parts and a bill of material to effect the change in hardware.

Escalation - The process of increasing the level of support when and if the field engineer cannot correct a hardware or software problem within a prescribed amount of time, usually two to four hours for hardware.

Fiber Optics - A transmission medium which uses light waves.

Field Engineer (FE) - For the purpose of this study, field engineer, customer engineer, service person, and maintenance person were used interchangeably and refer to the individual who responds to a user's service call to repair a device or system.

Field Service Management System (FSMS) - A specialized application program that automates some (if not all) of the following activities of a field service organization: call handling, dispatching, parts inventory and tracking, billing, efficiency reporting, and other functions. Ideally, the system accesses one data base from which each function can use and modify data.

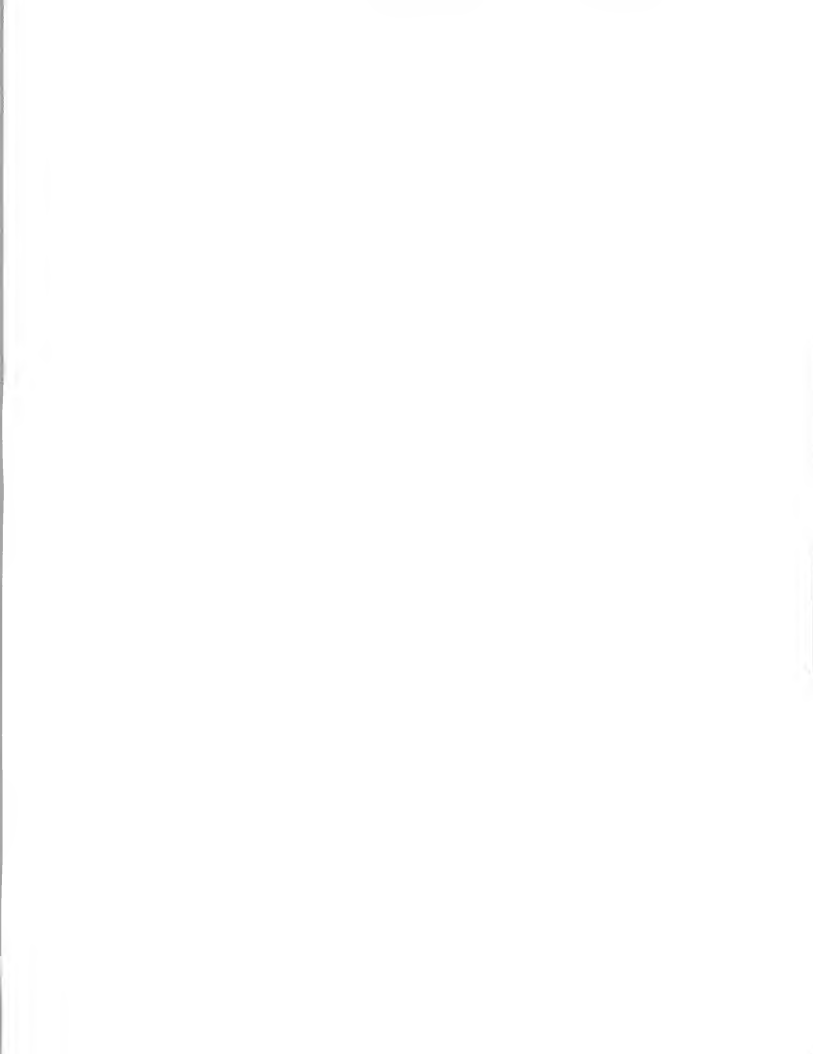
Hardware Integrator - Develops system interface electronics and controllers for the CPU, sensors, peripherals, and all other ancillary hardware components. May also develop control system software in addition to installing the entire system at the end-user site.

ISDN - Integrated Services Digital Network. A proposed standard for digital networks providing transport of voice, data, and image using a standard interface and twisted-pair wiring.

LADT - Local Area Data Transport. Data communications provided by the BOCs within local access transport areas (LATAs).

Large System - Refers to traditional mainframes including at the low end, IBM 4300-like machines, and at the high end, IBM 308X-like machines. Large systems have a maximum word length of 32 bits and a standard configuration price of \$350,000 and higher.

Mean Time Between Failures (MTBF) - The elapsed time between hardware failures on a device or a system.



Mean Time to Repair - The elapsed time from the arrival of the field engineer on the user's site until the device is repaired and available for use.

Mean Time to Respond - The elapsed time between the user placement of a service call and the arrival at the user's location of a field engineer.

Microcomputer - A microprocessor-based single or multiuser computer system typically priced at less than \$15,000. A typical configuration includes an 8- or 16-bit CPU, monitor, keyboard, two floppy disk drives, and all required cards and cables.

Minicomputer - See Small System.

Operating System Software (Systems Software) - Software that enables the computer system to perform basic functions. Systems software, for the purposes of this report, does not include utilities or program development tools.

PBX - Private Branch Exchange. A customer premises telephone switch.

Peripherals - Includes all input, output, and storage devices, other than main memory, which are locally connected to the main processor and not generally included in other categories, such as terminals.

Planning - Includes the development of procedures, distribution, organization, and configuration of support services. For example, capacity planning and installation planning.

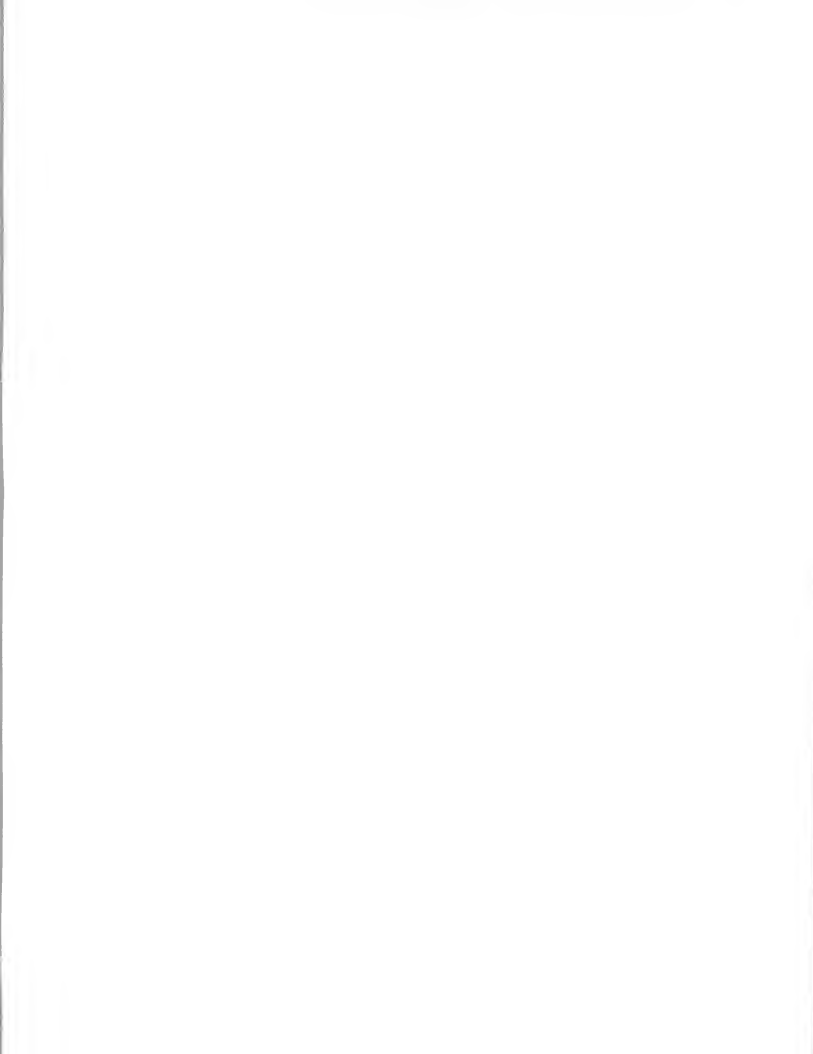
Plug-Compatible Mainframe (PCM) - Mainframe computers that are compatible with and can execute programs on an equivalent IBM mainframe. The two major PCM vendors at this time are Amdahl and National Advanced Systems.

Professional Services - A category of services including system design, custom programming, consulting, education, and facilities management.

RBOC - Regional Bell Operating Company. One of seven holding companies coordinating the activities of the BOCs.

Remote Diagnostics - Gaining access to a computer from a point physically distant from the computer in order to perform problem determination activities.

Remote Support Implementation - An extension of remote diagnostics where some level of support delivery is performed from a point physically distant from the computer. Currently, this capability is more common to software support, where problems can be solved or circumvented through downline loading of new code (fixes).



Reseller - A marketing organization which buys long-distance capacity for others at wholesale rates, selling services at retail but discounted prices and profiting on the difference.

Small Business Computer - For the purpose of this study, a system which is built around a Central Processing Unit (CPU), has the ability to utilize at least 20MB of disk capacity, provides multiple CRT workstations, and offers business-oriented systems software support.

Small System - Refers to traditional minicomputer and superminicomputer systems ranging from a small multiuser, 16-bit system at the low end, to a sophisticated 32-bit machine at the high end.

Software-Defined Network - A private network which uses public network facilities and which is configurable as necessary by the user (see Virtual Private Network).

Software Engineer (SE) - The individual who responds (either on-site or via remote support) to a user's service call to repair or patch operating systems and/or applications software.

Software Products - Systems and applications packages which are sold to computer users by equipment manufacturers, independent vendors, and others. Also included are fees for work performed by the vendor to implement a package at the user's site.

Superminicomputer - See Small System.

Systems Integration - A single service vendor's design, development, and implementation of a system or subsystem, including integration of hardware, software, and communications facilities, for a customer.

System Interruption - Any system downtime requiring an Initial Program Load (IPL).

Systems House - Integrates hardware and software into a total turnkey system to satisfy the data processing requirement of the end user. May also develop systems software products for license to end users.

T-1 - Refers to a standard 1.544 megabit-per-second digital channel used between telephone company central offices and now used for microwave, satellite, fiber optics, or other bypass applications.

Third-Party Maintenance (TPM) - Any service provider other than the original equipment vendor.

Training - All audio, visual, and computer-based documentation, materials, and live instruction designed to educate users and support personnel in the ongoing operation or repair of hardware and software.

Turnkey System - Composed of hardware and software integrated into a total system designed to completely fulfill the processing requirements of a single application.

VSAT - Very Small Aperture Terminal. A small satellite dish system, usually using Ku-band frequencies.

Virtual Private Network - A portion of a public network dedicated to a single user.

